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ABSTRACT

The booklet describes the natural ecosystem of the earth, the ways humans have evolved and diverged from basic life-supporting processes, and the problems that divergence has created. It also offers guidelines for overcoming those problems. Bakavi, a Hopi Indian word, is an umbrella term for the following objectives: to develop a way of life in which materials are managed in continuing cycles and energy is taken from continuously reliable sources; to encourage life-based pursuits, including interpersonal relations, creativity, appreciation, and spiritual, intellectual, and psychic development; and to develop technologies which use renewable resources and do not degrade the enviornment. The booklet is presented in ten chapters. Chapter I defines Bakavi and explains its origin. Chapter II describes the interaction of various earth cycles and resources. Chapter III explains pattern integrity. Chapter IV discusses biological and cultural evolution, pointing out that people have forgotten their dependence on natural processes. Six problems are stressed in Chapter V: diminishing energy supplies, resources depletion, land deterioration, pollution, population growth, and isolating social conditions. Chapter VI introduces Bakavi, explaining objectives and background, and suggesting individual actions. Chapter VII and VIII explore Bakavi values and life-based pursuits. Chapter IX offers some alternative technologies and Chapter X proposes smaller communities with more human input and interaction. An annotated bibliography concludes the booklet. (CK)

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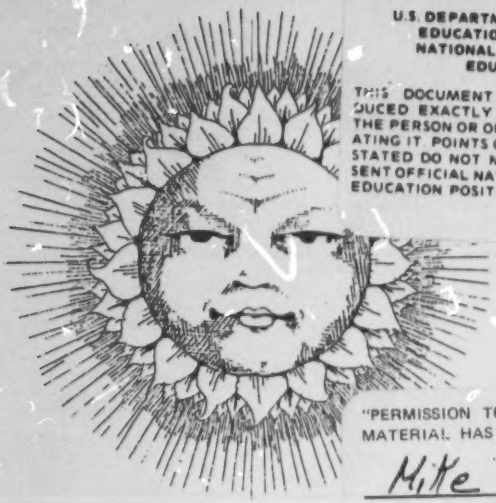

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BAKAVI

Change the World I Want to Stay On

Written by Mike Nickerson
Illustrated by John Daveikis

SO 010 888

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DEDICATION

To the spirit of unstructured, cooperative education which originally inspired Rochdale College; and to Buckminster Fuller and The World Game to which that spirit led.

After the work of Copernicus and others had demonstrated that the earth was not the centre of the universe but only a part of a much larger system, the world began to change its vision of reality. The process took hundreds of years. Today, because humanity has become a dominant influence on earth, we are faced with another such change: from nature being a convenience for people, to people being a part of nature. The scope is similar. The practical significance is of far greater consequence than the Copernican revolution but we have only a generation to complete the change.

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Preface

When I started living on my own in 1968, I became curious about the means by which our society supported itself and me as a member of that society. It was not long before I could see that our socio-economic system requires continual inputs of finite resources; is beyond control of those who depend on it; and that great numbers of people are not happy with the work they do to keep the system running.

It seemed worthwhile to devote time to talking with people about and studying ways in which our way of life could be made more secure and satisfying. By the end of 1974 certain patterns had become evident; these were only reinforced by further information. The question then arose: How can these patterns be effectively communicated?

Early in my inquiry a friend asked me: "Are you going to write a book?" The thought was startling. When the question of effective communication arose, however, it became obvious that a book would be the best way to proceed.

Those who taught me English through my school years would have thought me ill-suited to take on a writing project such as this. Indeed, there were many times during the project when I felt the same way. Nevertheless, I have been inspired by the urgency of the message and by a feeling of obligation to the many people who have given of their time and resources to teach me and give me time to study.

I would like to thank Russ Hazzard for editing two drafts of the manuscript and suggesting many ways to make the ideas and information they contained come through more clearly and in a more readable fashion. Also, thanks are due to Michael Bein and Gordon Edwards who helped with rewriting several sections and to Cal Parno and Mike Huk who have looked over the manuscript and helped polish the presentation.

Thanks to the people working on the *Limits to Growth/ Diet for a Small Planet* exhibition at Sir George Williams University who said it was OK to use the phrase "Change the world I want to stay on". There are many of us who can identify with this thought.

Thanks also to Lise-Anne Grandbois, Heather Hess, Jeanne Trudel, Beverley Adams, Joanne Hoop, Mitchel Beer, John Bianchi and the Is-Five Foundation for invaluable help.

My parents Betty Nickerson and Dr. Mark Nickerson deserve mention for their long-standing encouragement and their financial assistance for printing this book. I am also greatful to Ruth Schuster who has for many years encouraged and supported my work.

A last specific mention is for the Ontario Arts Council for making a grant to John Daveikis to support him while he worked on the many illustrations which accompany the text.

There are, of course, many other people who have helped from time to time with ideas, suggestions, labour, money and access to facilities. To name them all would be impossible but they deserve thanks. This book would still be a long time coming without the people who have cared to help.

Thank you all.

M. N.
May 1977.

Introduction

Whoever or wherever we are it is certain that we share the same earth and sun. We also share a history of generations of people working with the materials of the earth in the presence of energy from the sun. Each generation has used its knowledge, skills and effort to provide for itself and for the next generation.

There can be no doubt that cooperation has been a primary factor in this history. The fact that our species has flourished and gained dominance is largely due to its inclination and ability to cooperate. Cooperation seems to come naturally to us, and the extent to which we cooperate is greater than appears on the surface. As an illustration, let us consider the simple example of two people working together, one hammering nails while the other holds a board. As well as the obvious conscious cooperation that is taking place between them, this situation implies cooperation between these two people and those who made the hammer, nails, and board. Implicit cooperation, in this case, extends even farther back in time to a broad network of human beings including all those who, at one time or another, experimented with primitive pegs, mallets, square nails, hammerheads and the like, and who learned a little and passed this knowledge on, until it was eventually utilized by our two people. And certainly there must have been those who taught and provided for all these people. The network of cooperation spirals backward *ad infinitum.*

Since, over the centuries, those techniques which produced the best results tended to be the ones that were passed on, those of us living today have inherited a vast body of the experience of generations. This legacy of cooperation includes much of our present culture.

The historical progression of techniques developed by societies for dealing with the physical world, their own members and other societies is their cultural evolution. This book is concerned with the evolution of our culture today and through the changing times ahead.

Although for most of our history the management of our lives has had a relatively minor impact on the basic life cycles of the planet on which we live, today this is no longer the case. Our numbers and the might with which we manipulate our environment have become sufficiently great, to significantly alter some fundamental processes to the point that we are in the shadow of serious global problems unless we can adapt our societies to the changing relationship between ourselves and our planet.

That we are in such a predicament is due largely to the fact that our present Western societies experienced their development during an era when the world seemed unlimited in size and wealth. In the not too distant past, the rivers flowed steadily with clear water and the wind blew away the industrial smoke without leaving a trace. Ever-receding frontiers and seemingly endless resources placed few constraints on the accumulation of wealth and power which, in their turn, enabled more and faster growth. Only in the last few years has the finiteness of these various blessings been felt. And though there still exist vast reserves and untapped resources, our consumption and waste is equally vast. It is no longer well-advised, if it ever was, to base our civilization on the blind assumption that there will always be more.

'Bakavi' is a word which originates in the tradition of the people who may have been the first human settlers in North America, the Hopi.

In the accounts that have been passed from generation to generation for millenia, it is said that their civilization has been destroyed three times. Each disaster followed the same basic pattern. The people started out living in the natural environment, intercepting the flow of matter and energy and living from it. They were successful in increasing their numbers and building up their settlements.

This went on until what they had built became so extensive that the people were immersed in their own works and lost contact with the natural processes from which they had come. Actions were taken without regard for the way of creation that produced and maintains life.

In each cycle there were individuals within the culture who were still aware or who had become aware of the process of nature. These people realized the folly of living in ignorance of that process. They moved away and were able to evade the fall of their civilization.

The first world was destroyed by fire, the second by ice, the third by flooding. In the last instance, the people who had moved away gathered up reeds that grew in the area and made boats in which they rode out the high water. They eventually reached North America, migrated around the continent and settled in Arizona where their descendants are living today.

Their name for the reeds was 'bakavi'.

Similarly, at this time we are in a situation in which people are so involved with human creations that they ignore the flow of matter and energy that make life possible. Our cities expand, our industries boom and most of the population believes that life consists primarily of jobs, mortgages, life-insurance, and the consumption of industrial goods.

There is, however, an increasing number of people who have become aware of accumulating evidence that our traditional guidelines for development are unable to ensure a secure future for ourselves and our children. For those who are willing to adapt their expectations and behaviours, a new framework for developing our society will carry them through the turmoil to come.

The word 'bakavi' is being used here to represent a formula for cultural evolution that can help us avoid the serious problems that are inevitable if we continue in the ways of our past. Bakavi is a way of living in which people produce the necessities of their existence in such a manner that materials which do not regenerate themselves are managed so as to avoid loss, with needed energy being derived from inexhaustible sources such as the sun and the wind.

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Though it will require a vast change in our present arrangements, the achievement of such a self-perpetuating balance is far from being hopeless. Indeed, the physical resources that still surround us suggest that it is quite feasible. In addition, we have on our side access to the accumulated wisdom of centuries, and among us is the largest and best-informed assemblage of researchers and inventors ever known. Only our social inertia stands in our way.

Bakavi imposes only three limitations on what we can do. Our actions are consistent with Bakavi so long as they do not:

1. require a continual input of non-renewable resources
2. have a cumulatively degrading effect on the environment
3. require more resources than would be available if the world's resources were equitably distributed amongst the world's people.

In recognition of these material restrictions, it is likely and desirable that individuals in a bakavi culture would draw more heavily on their potentials as human beings. The satisfaction to be gained from interpersonal relations, creativity, coordination, appreciation and intellectual, psychic and spiritual development would well complement the careful management of matter to maintain a healthy life in a secure, comfortable home.

There are different ways in which the word "Bakavi" will be used in this text. When used with a capital 'B', it refers to the framework defined on the back cover, or in some cases to the association of people making an effort to work within that framework. With a lower case 'b' it is used as an adjective to indicate an object or activity which fits within the framework represented by Bakavi.

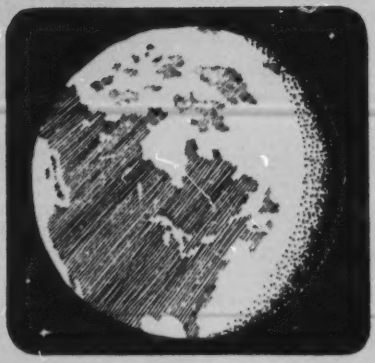
This book is not intended to give a lot of detailed information; libraries and book stores abound in such material. Rather, its intention is to demonstrate the relationships between the natural life-supporting processes of the earth, the way in which human beings have emerged and diverged from that process, the problems that divergence creates, and the guidelines within which we can develop to overcome those problems. Though a particular statement of how to redesign our culture would probably be interesting, it

could never cover the multitude of activities that society is involved in. Furthermore, many people would dismiss such a plan because it originates outside themselves and would be unlikely to conform with their expectations.

So rather than try to evolve here a detailed blueprint for change, it is better that we each look at the situation and apply our own knowledge, imagination, and creativity within the Bakavi limits to those aspects of society with which we are involved. Each one of us has a potential for seeing things in a new way. Something which seems obvious to one person may not have occured to another. In the final analysis, this new light which each of us can shed is our greatest hope.

Bakavi is a tool by which individuals agreeing with its values can recognize each other and share their perspectives for a cooperative effort to overcome problems which are obviously greater than any of us can handle alone.

The Natural Ecosystem



Within the lifetime of most of us the first photographs of the Earth as a cloud-swept island in empty space have become available for contemplation. Ever since the world was proven to be round it has been acknowledged that we are living on a single sphere. Nevertheless the pictures have added a new depth to this awareness. Today we have all clearly seen that our home, the planet earth, is finite. Along with this realization has come a growing popular concern about the effect that human beings have on "Spaceship Earth". To understand how we are changing our planet we must be clear about how it operates in its natural state.

From the viewpoint of a spacecraft it is clear that the physical reality of life on earth basically involves only the planet and its sun and moon. It is true that there are multitudes of other planets and suns in the universe and from time to time we might focus our resources and hurl a few representatives of our kind on an adventure to explore these neighbours, but for the billions who remain, life will have to be within the finite system that has always been our habitat.

For eons the earth has orbited around the sun, passing through the continuous stream of energy that emanates from that miraculous source. Through the hot and cold of days and nights, summers and winters, the sun's energy has powered the winds and the water cycle. Together these forces have shaped the lands and provided the sea with minerals.

Also, long ago the electrical flashes of thunderstorms transformed enough oxygen into the more complex molecule ozone to completely surround the earth. Even to this day the ozone layer stops the penetration of the sun's deadly ultraviolet rays.

The stage was set; the sea was rich with dissolved minerals, warmed by the sun and protected by the atmosphere. In events so long past that we can only guess at their occurence, the mixing of elements into more and more complex molecules resulted in a form that could reproduce itself. Life had begun.

Since the time of life's first occurance it has spread to cover most of the globe. Almost all of the air and water on the planet has passed into and out of the life-proces numerous times and currently billions and billions of tons o the earth's elements are involved in the living mass.

From a distance, the green and blue ball that we live on can be seen as one life: the biosphere. Our experience on the ground teaches us that all the materials taken in by any part of this whole are fixed only temporarily, and eventually pass on to be used again and again. There are exceptions, as in the cases of coal and potash deposits, where some materials have settled out of circulation, and as rocks are worn away new materials enter the flow but, for the most part, the materials involved in life are continuously being used and reused. All can be accounted for. All, that is, except the synergetic surplus of consciousness. (Synergy occurs when the whole is greater than the sum of the parts.)

Let us now turn our attention to how the sun and the earth interact to maintain life. As the sun's rays warm the land and seas, water vapours rise and the winds which are set in motion carry the moisture over the land. Not only is the water from the falling rain itself essential to all types of life, but so, too, are the minerals and organic nutrients which it dissolves as it passes through the soil to the roots of plants. Well over ninety percent of the water drawn in through the roots and up through the plant is lost in evaporation through the leaves. The dissolved materials are left behind and accumulate in the plant to be used for growth and maintenance. Thus through the power of the sun and the medium of water, substances that were in the ground become incorporated into living matter.

Some of the water which remains in the plants is used in photosynthesis. Photosynthesis is the way in which the sun's energy is captured and made available for the use of living organisms. Within the green parts of plants, water and carbon dioxide from the air interact with sunlight. The molecules

involved combine by using solar energy to form their new bonds. In the process a simple carbohydrate is formed and oxygen is given off. Once formed, the carbohydrate can be stored for future use. When it is needed, the process can be reversed; in the presence of oxygen the carbohydrate can be broken down and restored to its original parts. The energy which had come from the sun can then be used to arrange nutrients and form bonds to construct proteins, fats, vitamins and whatever else is needed for growth, maintenance and reproduction. The same energy enables living things to move.

With the exception in recent times of energy released by nuclear reactors, all of the energy that has been used by the living world has been made available by photosynthesis. Green plants are the first reserve of this energy. When a green plant is eaten, for instance by a caterpillar, the stored energy is transferred along with the various nutrient components of the plant. The caterpillar can now use these same substances for its own purposes.

Similarly, if the caterpillar is eaten by a bird, the energy and matter embodied in its tissues can be used to build the tissues of the bird. Each time the nutrient elements change users, however, eighty to ninety percent of the energy is expended, which partly explains why there are more leaves than caterpillars and more caterpillars than birds.

When the bird's waste matter, which contains unused remains of the caterpillar as well as old matter cleaned from its own body, is excreted onto the ground, it joins the dead remains of other plants and animals and becomes the diet of another level of organism. Bacteria by the billion, earthworms, mites, thrips, grubs and the like as well as many varieties of fungus, all glean the last little bits of solar energy from these remnants of other life, all fashion their own peculiar patterns for growth and regeneration from the components of other beings. In turn, they excrete elements in a form that can be taken up by plants to continue the cycle.

Such is the capture and dissemination of energy and the cycling of matter. Our position in these processes as human beings is no less dependent on the services of green plants than are those of caterpillars, birds, mushrooms and all the rest.

It is interesting, on closer examination of the components involved in the life process, to note that the majority of living matter is made up of a relatively few abundant elements.

In 1652 Jean-Baptiste Van Helmont wrote about an experiment he conducted in Amsterdam:

> "I took an earthen vessel in which I put 200 pounds of soil dried in an oven, then I moistened it with rain water and pressed hard into it a shoot of willow weighing five pounds. After exactly five years the tree that had grown up weighed 169 pounds and about three ounces, But the vessel had never received anything but rain water or distilled water to moisten the soil when it was necessary, and it remained full of soil, which was tightly packed, and lest any dust from the outside should get into the soil, it was covered with a sheet of iron coated with tin, but perforated with many holes. I did not take the weight of the leaves that fell in the autumn. In the end I dried the soil once more and got the same 200 pounds I started with, less about two ounces."

Obviously the willow's growth consisted mainly of elements from the air and water rather than the soil. In fact, carbon, oxygen and hydrogen, the building blocks of the photosynthesis process, account for the willow's bulk as they do for the bulk of all living matter. These elements are plentifully available everywhere on earth, with the exception of hydrogen from water in some dry areas.

Nitrogen is the next most important component. Nitrogen makes up about eighty percent of the air, but it cannot be used directly. It must first be converted by microorganisms into a form that can be used by plants. As a result, much of the nitrogen involved in living things has been taken from other living things. The other major nutrients, phosphorus, potassium, calcium, sulphur and magnesium are also slow to enter the life process and are for the most part recycled from other life.

In addition to these major nutrients there are a number of minor ones that are needed only in small quantities. These include iron, manganese, copper, zinc, boron, silicon, molybdenum, chlorine, vanadium and cobalt. Although only very small quantities of these elements are needed, their presence is essential for healthy growth. It is a "law" in ecology that the growth of a plant or animal is limited by the element in its surroundings that is in least supply; that is, in least supply in proportion to the quantities in which the different elements are needed.

For example, in Australia farmers wanted to raise sheep in an area that appeared to be healthy range land. Attempts to keep the animals in this particular area were unsuccessful and quite puzzling until extensive soil tests revealed a lack of cobalt. Cobalt is unnecessary for growing plants to do well, but is essential for the well-being of animals living on the plants. When this was discovered small amounts of cobalt were added to the range lands and the problem was solved.

The natural process that produces good soil for growing things is a slow one involving the weathering of rocks and a gradual build-up of organic matter as generations of plants die and decompose. An inch of good topsoil typically takes several hundred years to be formed. The geological processes involved in the earth's formation have distributed the basic elements so that some areas are endowed more abundantly and completely than others. As in the situation mentioned in Australia where certain elements are lacking, it is possible to bring them in from areas where they are abundant. Once established, however, barring the removal of nutrient elements by unusual circumstances, a good soil remains the biological capital of the area. Its substance can be used and re-used, providing for growth and health as successive generations of plants, animals and people take their places in the sun.

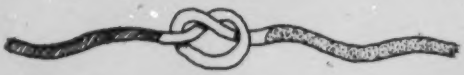
Pattern Integrity

The complexly interrelated cycles that make up living systems can be understood more clearly in terms of the basic principle of pattern integrity. It is an important idea which could facilitate the adoption of bakavi principles if it were more widely understood.

Pattern integrity can best be understood by visualizing a length of manila rope with another length of hemp rope finely spliced onto one end. At the other end of the hemp rope is spliced a length of jute. In all, we have one continuous piece of rope with easily distinguishable portions.

Now take the section of manila rope and form a loose slipknot with it.

Slide the knot down the rope past the first splice onto the hemp section.



Notice now that the new material enters into the pattern of the knot, gradually replacing the various curves until the entire knot is made of hemp. As the knot continues along the rope its composition changes from hemp to jute. Once again the material from which it is made changes completely but the pattern remains the same. This change-over continues until the material is exhausted and the pattern disintegrates.

The endurance of the pattern of the knot while the material of which it is composed changes from manila to hemp to jute illustrates pattern integrity.

The concept is significant because our physical bodies are pattern integrities. In any one-year period we can expect about 98% of the material in our bodies to change. The slow continuous change-over is almost imperceptible because the overall pattern maintains its integrity. After a number of years there is essentially nothing left of the matter from which we were previously composed, yet our bodies are basically the same.

Returning to the rope model, notice that if the ends of the rope are joined together, it is possible for the pattern to move for as long as there is energy to advance it.

Organic gardening provides the same sort of perpetual system. Assuming that adequate care is taken to avoid the spread of disease, we can take the nutrients used and discarded by our bodies and compost them along with the unused parts of what we grow for food. The compost can then be spread on the gardens and fields where the nutrients will be taken up by plants that we can consume to nourish our bodies. The only thing that is lost in the process is energy which radiates away as we metabolize our food. This loss, however, is made up when the growing plants capture energy from the sun. Such a system, unless disrupted by unusual circumstances, can continue for as long as the sun shines. There are places in the world today where these practices have continued for forty centuries.

Even with perfect nutrition individuals wear down over time, but through reproduction our species is rejuvenated and the pattern of our culture is able to continue. This pattern (to be examined in the next chapter) is a complex one involving along with food such things as the energy, tools, clothing and other items we utilize in our daily lives. Many of the things which we bring into our lives are not part of the biological cycles.

At present, much of what we consume is simply lost, never to be regained. Our civilization, like the knot, is moving along toward the end of its rope. It is necessary, if our culture is to endure, for the ends of its "rope" to be brought together. This is our challenge today.

The Collective Human Organism

In developing an understanding of how human beings affect the natural process of life, it is necessary to recognize that there is more to our presence on earth than just our many individual selves. The integration of our many activities is so thorough that from the earth's viewpoint all of our construction, production, transportation and communication as well as all the individual lives in our societies can be seen as belonging to a single organism: the collective human organism.

It has already been mentioned that more and more of the earth's elements have been brought into circulation since the origin of life. Investigation of fossilized remains has revealed that many thousands of species have arisen out of this biological capital from the simple beginnings until now. The evidence provided by these remains suggests that organisms have been increasing gradually in complexity over the years, acquiring more and more sophisticated abilities to sense and control their environments. The puzzle this pattern presented was first explained by Charles Darwin in his theory of evolution as being due primarily to the twin processes of mutation and natural selection.

Basically the theory argues as follows: By chance (or by manifestation of will?), an organism would be born with an unusual characteristic. Sometimes the new characteristic would be maladaptive and would lead quickly to the organism's demise. On the other hand, if this new characteristic made it better equipped to provide itself with the nutrients it needed for healthy growth or made it better able to subdue or evade its enemies, it was more likely to survive and reproduce than were its less well-endowed contemporaries. Similarily, its offspring or the portion thereof that inherited the same positive characteristic were more likely to survive and spawn more of their kind.

Meanwhile, the original species may find itself unable to compete with the improved version and may become extinct for lack of food or space. This process of natural selection

of the better-equipped species at the expense of the weaker especially takes its toll in times of great environmental upheaval – ice ages, floods and the like. Through the simultaneous operation of these two principles, new forms of life have arisen to replace old ones and the life has been able to evolve into ever more complex and intelligent forms. Until recently (by geological standards) this pattern of evolution was the most dynamic process in the development of life on earth.

As life progressed so did its level of consciousness. With the arrival of human beings came not only the ability to handle tools, a great capacity for memory and the intelligence to reason, but, above all, humans were sufficiently conscious of what passed in their lives to be able to form symbols and communicate. In the same way that having a nervous system makes it possible for the cells of an individual organism to act together for their common good, the faculty of communication leads to cooperation. "Help me move this rock, it is heavier than I can lift alone." With people working together for mutual benefit a new entity was formed: the collective human organism, the current vanguard of the evolutionary process.

Imagine a skin encompassing all human activity and you will recognize the largest, most complex and most versatile life-form that has ever lived on this planet. Still part of the biosphere, the inter-dependent web of all living activities, this organism is now the most potent component of that web.

When the collective human organism emerged the evolutionary process took a new turn. No longer are mutations and natural selection the primary factors shaping development on the surface of the earth. Their places are taken by innovation and communication. Biological evolution is surpassed by cultural evolution.

A culture is made up of the many ways of doing things which have been devised and adopted to serve various purposes. Each technique involved is a cultural item. Cultural items range from the knot used to tie a shoe to methods used by parents to get their children to go to sleep, including all of our tools, clothing, vocabulary and values.

Unlike biological evolution in which an advantageous mutation is spread through the long process of inheritance by offspring, in cultural evolution a new cultural item can be

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communicated directly. It became possible for the innovator to explain his discovery to others who in turn could spread the knowledge to the people they came in touch with. In this manner an innovation could become dominant within the lifetime of the innovator. On the biological level information is passed from generation to generation by genes. On the level of the collective human organism, information travels by means of symbolic communication.

An expansion, at this point, on the parallels between an individual organism and the collective organism will serve to make the identification of the latter clearer and consequently, will make it easier to see how, as a whole, our culture fits within the established framework of life on earth.

Most creatures have some sort of mouth with which they consume the food that they need to build and maintain their bodies. Similarily, our culture has harvesters that bring in the food we eat and enormous shovels that chew up the earth to bring us the metals and minerals which we use to build and maintain our many structures and systems. An oil well is like a drinking straw in the mouth of the collective human organism. Once food is eaten, an individual organism digests it into constituent parts and then re-assembles them into proteins, fats, enzymes and whatever else the organism needs. In the collective organism this process can be compared with the refineries that separate metals from the surrounding rock or render the kerosene, gasoline, heating oil and other products out of crude oil and the factories where raw materials are made into items ready for the various needs of society. In this example an important difference exists between the organs of the former and the institutions of the latter. Whereas both serve functions for the entities that grew or built them, they differ in their ability to change if their living situations change. On the biological level, remaining the same in a changing environment can mean an organism's extinction. However, institutions are consciously conceived and it is within our capacity to alter them to suit changed circumstances.

It is not only in physical form that the integrity of the collective human organism can be compared with its biological predecessors. There are parallels in our collective being to the feelings and the awareness that we as individual humans possess.

Everyone knows that when a person is feeling low, his or her ability to do things is impaired, and that when all is well one's abilities are enhanced. It is also clear that one person with strong feelings can affect the mood of others. Our language expresses collective feelings when we talk of the morale of a team or other groups of people. Looking at the interaction of feelings of individuals, groups and society as a whole, it is obvious that there is a collective phenomenon. The manifestation of this collective feeling in a society ranges from golden ages to great depressions. It is important to note here that each one of us individually can affect the collective well-being by the attitude we project. Every bit helps as it ripples through the inter-connected web of feeling that permeates our society.

Similarly, there is a collective understanding. The knowledge that each of us has of the world develops from the accumulation of what we detect through our senses and from the relationships which we recognize between those bits of information. The collective parallel of this process is evident as soon as we recognize that some of what we know has been taught to us by others. In turn, those we learn from will have based much of their understanding on the works of yet other people.

In addition to the variety of sense organs through which the people of a society draw information we also have the use of telescopes, microscopes, radar, heat-sensitive film and numerous other tools which have been devised to acquire information which is beyond our normal perception. Furthermore, many people choose to focus their attention on some particular aspect of the world. By becoming familiar with that aspect, and training their senses and making tools to observe it carefully, they are able to develop understanding which would not be otherwise available. There is a limit to how many studies a person can dedicate time to. However, there are many investigators and when their many findings are recorded it is all available to the collective human organism. Our collective knowledge also goes beyond what is discovered by everybody alive today, and includes what was recorded by people who have long been dead. This accumulation of knowledge will be available for as long as the continuity of civilization is maintained.

By now the meaning of the 'collective human organism' should be clear. The form which it now takes is considerably different from the form it took when human culture first emerged. The early form changed slowly since knowledge, techniques and new ideas could only be passed on through personal contact. With the development of writing it became possible for contacts to be made over distances and time. Then the printing press multiplied the exposure to writing, and now telephones, radio, television and telecommunication satellites make it possible to reach great portions of the world's population almost instantly. As a result, innovations no longer take generations to come into widespread use. A new development can now be applied in thousands of places at once soon after it is discovered, and often before there is time to fully investigate it for damaging side-effects.

But a problem now arises. (Indeed it is a problem which results in many problems, as will be seen in the next chapter.) Whereas individual species have evolved through the workings of natural selection, the collective human organism is almost totally directed by its own will. Since our cultural evolution out-paces the slow workings of natural selection, people tend to forget that we are still dependent on the natural processes. Consequently, the decisions which direct our evolution are based on considerations other than compatibility with life on earth. However, as time goes by the effects of our culture are being felt and eventually our viability will be determined.

The key to solving this problem lies in the fact that our collective society has a will with which to determine how we will grow. The strength of will can manifest in a number of ways: it can be unclear, as it is today, being affected by complex interactions of many individual self-interests. It can be dictated by a trusted or powerful leadership, or it can be determined by a consensus of individuals. Which of these manifestations directs our future depends on how many of us choose to be active in solving these problems and how many of us try to avoid them.

It is important to remember that we are not fated to drift helplessly into the times ahead. Our society can change purposefully.

Problems We Face

There has been life on this planet for hundreds of millions of years. But humanity is unlike any life-form that has even lived here before, particularly with respect to our modern way of life. As mentioned earlier, our culture has yet to be tried in the court of natural selection. And it is questionable how we will fare in the upcoming judgement.

There are several disturbing signs that our trial is near. To various extents our species is being pressured by diminishing energy supplies, depletion of other vital resources, strained agricultural production, pollution, over-population and deteriorating social conditions. It is the purpose of this chapter to introduce these problems. A more complete understanding can be developed by following the news and by looking into the many informative books which discuss these topics thoroughly. There are also environmental groups operating in many centres which exist to help people develop their awareness of these matters.

The problems to be outlined here are enormous. They are presented so that we can see why it is necessary for us to make a conscious, vigorous and united effort to transform our culture into one that does not transgress the limits of living on the planet earth.

Energy Supplies

Of the six problems mentioned above, diminishing energy supply has received the most attention in the popular media.

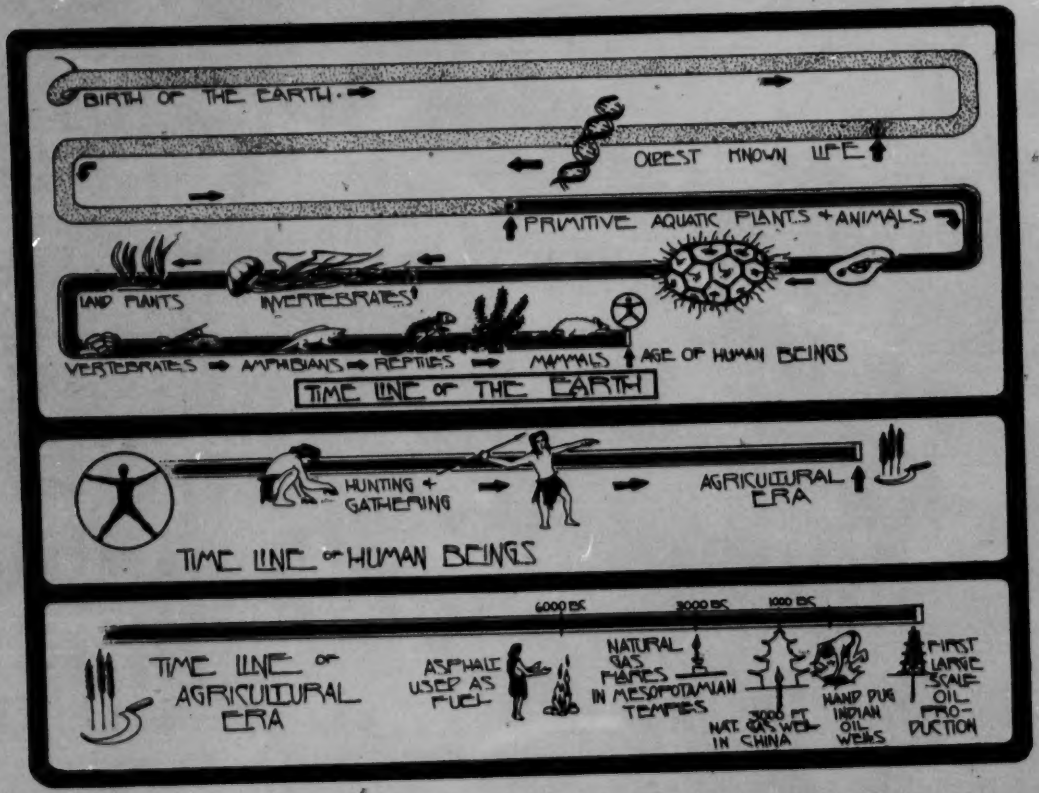
As we saw earlier, life has traditionally received its energy from the sun, either directly through photosynthesis or indirectly through consuming materials of photosynthetic origin. Indeed, until the first utilization of fire, these were the only sources of energy available to any form of life. Although only another way of liberating solar energy stored by trees, the use of fire represented a radical departure from the pattern of energy transfer strictly by photosynthesis and ingestion.

In some instances, often when ceramics and metal-working were practised, a community would consume trees to the point where it became necessary to move to a new location. But for the most part the introduction of fire had little effect on the life process.

The year 1698, less than three centuries ago, saw the invention of a usable, though inefficient, steam engine. With this engine to do the work of people and horses, coal could be dug more easily. A portion of this coal could then run the steam engine to dig more coal which in turn could be used to smelt iron to make more steam engines so that more coal could be dug up faster. As the engines started providing the fuel needed to reproduce and run themselves, a great change was underway. Coal was a main staple of the foundries and factories of the industrial revolution. By 1880 more coal was being burned than wood. Then, in turn, coal yielded to oil as the predominant energy source for human development.

Human culture has evolved dramatically through the accelerating use of fossil fuels. At first the replacement of muscle power by coal power proceeded slowly. More people became interested in mechanization as the efficiency of coal and later oil power was demonstrated. Since existing machinery could produce the necessary engines and tools, the technology spread. The more widespread it became, the faster it was able to spread further. This process has continued up to the present and has resulted in our consuming more energy in the last thirty years than was used in all previous human history.

The energy in both coal and petroleum comes originally from photosynthesis and the sun, but the present rate of consumption far exceeds the rate of production. Unlike wood, which can be replaced in the time it takes to grow a tree, the oil and coal that we burn will not be regenerated in a time span that is of any use to us. With the relatively recent shift to dependency on oil and coal, human culture stepped outside of the natural cyclic processes of nature.


BIRTH OF THE EARTH
OLDEST KNOWN LIFE
PRIMITIVE AQUATIC PLANTS + ANIMALS
LAND PLANTS
INVERTEBRATES
VERTEBRATES → AMPHIBIANS → REPTILES → MAMMALS → AGE OF HUMAN BEINGS
TIME LINE OF THE EARTH
HUNTING + GATHERING
AGRICULTURAL ERA
TIME LINE OF HUMAN BEINGS
6000 BC
3000 BC
1000 BC
TIME LINE OF AGRICULTURAL ERA
ASPHALT USED AS FUEL
NATURAL GAS FLARES IN MESOPOTAMIAN TEMPLES
NAT. GAS WELL IN CHINA
3000 FT
HAND DUG INDIAN OIL WELLS
FIRST LARGE SCALE OIL PRODUCTION

In the accompanying graph the immensity of the human consumption of energy is compared to nature's surplus.

On the time-line of the earth, the period of human presence has been expanded to indicate how long we have practiced agriculture. The agricultural portion has been expanded to indicate the length of time that we have been consuming quantities of fossil fuels, since the first producting oil well in 1859. From that time, given an optimistic estimate of how long the deposits will last, say 300 years, we will have used up what the planet was able to store over an 800 million year period, which is illustrated by the shaded portion on the first time-line.

The obvious fact that our present rate of fossil fuel consumption cannot be maintained without eventually forcing us to rely upon harder to reach, and therefore more expensive, sources and ultimately depleting all the petroleum and coal reserves of the planet underlies the "energy crisis".

Our situation is like that of a young person whose inheritance is about to run out, but who puts off becoming self-sufficient because it has been rumored that a rich uncle is about to die. Our "rich uncle" is nuclear energy.

There is no doubt that a great amount of energy can be derived from nuclear fission. The question is: Is it worth the risk?

Ralph Nader says that: "If the country knew what the facts were and if they had to choose between nuclear reactors and candles, they would choose candles."

The problems with nuclear energy stem from the dangers of radioactivity. Direct connections have been found between exposure to radiation and various types of cancer and genetic defects. As the Atomic Energy Commission in the United States has admitted, there is no exposure level to radiation below which there is "absolutely no harm" to life. It is therefore desirable that the level of radiation be kept as low as possible. A certain amount of radioactive material has always been present in a dispersed form in the earth's crust, but a far more dangerous concentration of radioactive elements is produced in nuclear reactors.

In designing nuclear reactors a great deal of emphasis is put on safety precautions. Some calculations put the possibility of there ever being a serious accident at millions to one against. Even so, there have been a number of accidents.

Some examples: In 1957 the Windscale reactor in Great Britain had an internal fire which caused so much radiation to escape that 500 square kilometers of surrounding countryside were effected and European neighbours complained of radioactive fallout. After the initial cleanup procedure was completed, no records were kept to assess the long-term effects.

In 1966 there was a week-long period during which it was feared that Detroit might have to be evacuated because of a partial melt-down in the core of an experimental breeder reactor.

More recently, in 1975, after a freak fire at the Brown's Ferry nuclear reactor in Alabama only the last of the entire series of safety cooling mechanisms was able to stop the overheated reactor from suffering a major melt-down.

These are some of the more striking instances. From time to time there are other reports of a leak here and a spill there.

A senior reactor safety engineer at the National Reactor Testing Station at Idaho Falls, Idaho, was quoted in Science Magazine, September 25, 1972, as saying: "This is being advertised as a no-risk business and that's not true. We don't know that reactors are unsafe, but we're concerned about their being as safe as the manufacturers would like you to believe. Maybe it's time the Atomic Energy Commission told the public that if people want to turn the lights on they are going to have to expect to lose a reactor now and then, and possibly suffer great dislocations and property losses as well."

Another problem with using nuclear reactors to provide our energy needs concerns what to do with the highly radioactive wastes produced. It is necessary to find a way to contain them for as long as 250,000 years.

In any case, the nuclear fuels, like fossil fuels, are non-renewable resources. The most commonly used nuclear fuel, uranium 235, is not expected to last any longer than petroleum reserves. In North America, stocks of coal are measured in centuries where as stocks of uranium are measured in decades. However, another type of reactor, the fast breeder

reactor, is being developed which can convert the less active but more abundant component of uranium known as uraniun 238 into plutonium 239 which can then be used to produce energy. This type of reactor can make the fuel go perhaps ten times as far as the ones currently being used, but they do not produce an ever-growing supply as has been mis-reported.

Any means of stretching nuclear fuel supplies involves reprocessing the highly radioactive reactor waste to extract the remaining portion of unspent fuel. Plants to do this are already in operation, and with each step of the process there are additional possibilities of radiation escaping.

One more cause for concern is that plutonium reactor fuel can be used to make nuclear bombs. This has already been done by India and the same could be accomplished by other countries, as well as by individuals wishing to blackmail society.

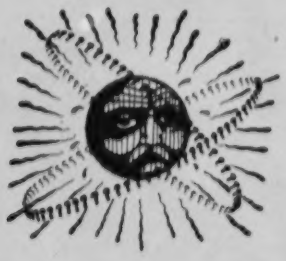
The solutions to these problems are not clear, yet a great deal of our society's wealth, energy supplies and human resources are being used to expand the use of nuclear reactors. Before opposition began organizing, the Canadian Government was projecting that Canada would have 115 reactors by the year 2000; the U.S. projected as many as a thousand for its own use.

The alternative to massive centralized energy installations is to learn to live with the smaller amounts of energy that can be captured by a decentralized society from the wind and sun. Such an option is made difficult because of the extravagant appetite which modern society has for energy. Accepting a low-energy diet would not come easily. Also, if people were harnessing their own energy it would not be possible for power companies to receive payments for every bit of energy used. Without the prospect of a continuous profit it is hard to find capital to develop the small-scale technologies.

A news release from the Canadian Department of Energy, Mines and Resources estimated that 110 billion dollars will be spent between 1975 and 1990 on development of electrical generating facilities. The relative emphasis with which our tax money has been spent was recorded later in the same news release. The federal research and development budget for 1975–76 allocated 74.7% of its money for nuclear projects compared to 1.4% for work on renewable energy sources.

Our future is being decided for us. The billions of dollars which are being spent on nuclear development would go a long way toward adopting our society to the use of solar and wind energy. Who is making the choice?

By not getting involved in the decision we are responsible if the nuclear option should prove disastrous, either within this era or years hence when uranium is spent, leaving only quantities of waste products as a Pandora's box in the care of generation after generation of our decendants. Anyone who consumes electric power is responsible for creating the demand. Surely, before we take on this responsibility we should know what we are getting into. It is time to insist on a complete and fully public inquiry into the benefits and dangers of nuclear energy.



Resource Depletion

A drop of water isn't very much, but if one drop a second were to leak from a faucet over the period of a year, it would amount to more than thirteen hundred gallons. With the perspective of this example it becomes easier to understand how the enormous resources of this planet could be exhaustible. Millions of people and their industries draw on those resources day after day and year after year, and in so doing consume unimaginably huge quantities of materials.

Fossil fuels and uranium have been mentioned as being in danger of exhaustion. Tungsten, copper, lead, zinc, tin, gold, silver and platinum are in the same category. All presently known reserves of these metals will be exhausted within the lifetimes of children born today, even if there were no increase in the rate at which they are being consumed. There is no doubt that new reserves of these materials will be found, but the rate of consumption will likely continue to increase as well, and the point remains that supplies are being significantly depleted.

The supply of metals differs from that of fuels on one important point. Whereas, once a fuel is burned it no longer exists, it is possible for metals to be re-used. To a considerable extent this is being done. Worn-out cars and machinery are melted down for their iron and the insulation is burned off old wiring so that the copper can be re-processed. Nevertheless the multitudes of individuals in our society still throw away enormous quantities of non-renewable resources and do not yet grasp the folly of such action.

Will it be necessary for people to be personally affected by the scarcity of some materials before they take the situation of resources supply seriously? Inconveniences brought about in this way would help immensely in developing a conserver ethic. There are, however, several pads which our industrial economic system puts between resource depletion and the consumer. These cushions absorb the impact of what might be significant lessons in resource management. Instead, most people are left slightly wary but mostly unchanged in their patterns of consumption and waste.

The first of these cushions is substitution: the replacement of a scarce material with a more abundant one that can serve the same function. North America has never had much tin. As external supplies have diminished the use of tin has been replaced by other materials. The "tin" can, for example, is now iron with a coating of zinc and sometimes plastic. "Tin" roofing is also iron and zinc. Because of the tendency for milk to pick up flavours, milk pails can still be found that are tin plated, but stainless steel has largely taken its place. This sort of substitution leaves the available reserves of tin for uses where adequate substitutions have not been found.

Another cushion is to take resources from other parts of the world where the local populations haven't consumed them on a massive scale yet. If the United States had been successful in subduing the Vietnamese, the U.S.-sponsored government would have been able to pay back its war debt by letting North America exploit Vietnam's large tin deposits. There is also the possibility that the "promising shows" made in drilling for oil off the shores of Vietnam may have influenced the U.S. involvement there. The aggressive method of securing resources has been more effective with copper in Chile and through the maintenance of sympathetic governments in the rest of the Americas.

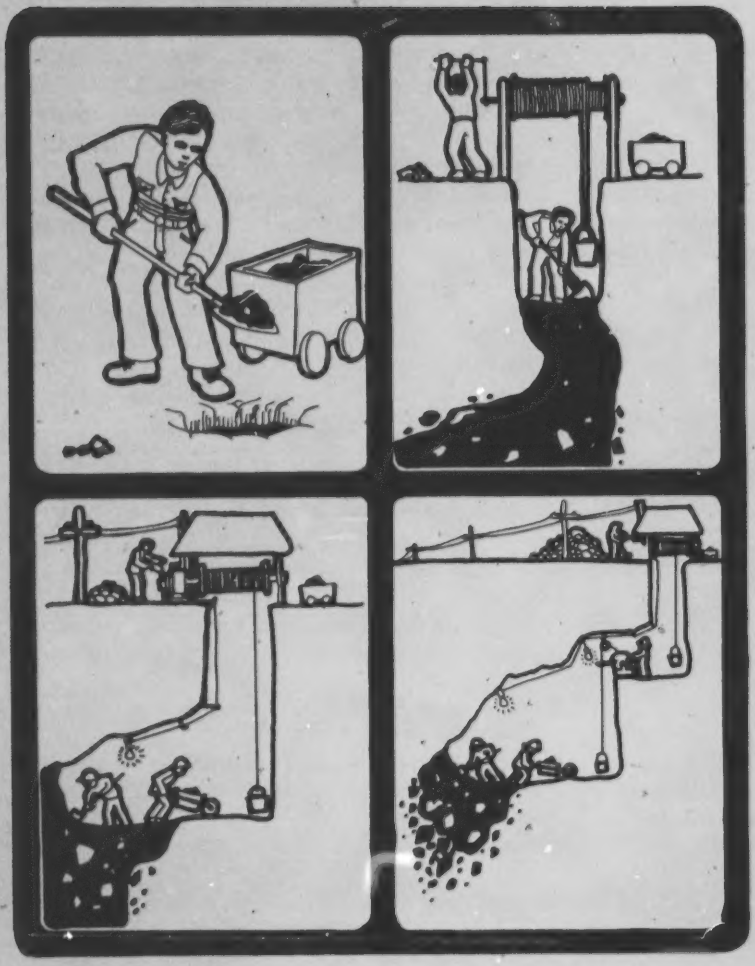
The final cushion to resource depletion is inflation. As the most easily accessible reserves of materials are used up, the extracting industries move on to more remote sources and to lower grade ores. This means that more energy must be used and more ore dug to produce the same amount of refined metal. Consequently, it costs more to the people buying it.

This illustration shows how at different stages of production from a mine it takes increasing amounts of work to bring the material out and to separate the desirable material from the surrounding rock.

The petroleum case is similar. More wells have to be dug deeper and further afield. As long as there was abundant oil in the south there was no need to brave the extreme climate of the Artic or to drill from rigs at sea. Delivery from these distant points presents problems as well. There has been a lot of news about the difficulties of building Arctic pipelines, and from time to time we read about oil spill disasters when tankers run into difficulties. Another example is the removal of the oil found off the coast of Labrador. The oil there will have to wait until prices are high enough to cover the cost of tunnelling under the sea bed and installing pipelines where they won't be destroyed by the icebergs that drift by, gouging the sea bottom.

The most obvious way that increases in the time and energy needed to produce a good is manifested is through price increases. Price increases which are more often blamed on the other admittedly aggravating factors of wage demands and corporate profits than on the fact that we are approaching the limits of living on this planet.

This last cushion is particularly dangerous because as long as the public can afford the increasing prices, the material will be available. Available, that is, until there really is no more, or, as in the case of some oil deposits, it takes as much energy to extract and deliver it as is produced. The danger is that critical supply situations may not be obvious until we no longer have the resources to reform our life-supporting system.



Agriculture

Aboriginal agriculture, as described earlier, involves a body of nutrients which cycles through plants, animals and people and eventually back to the soil in the same area. The energy used to cultivate the fields originally came from the food of the people and animals involved.

For a variety of reasons many people have moved out of these cycles into communities separated from food production. As a result, feeding people in cities requires that plants be removed from where they have absorbed their nutrients. After the people who use those nutrients are finished with them, the nutrients seldom make it back to the land from which they came. At best, they are treated as land-fill, and often, treated or not, they are introduced into the waterways where they upset the existing nutrient balance and are eventually lost to the sea. This export of nutrients from the land makes it increasingly less healthy. In fifty years of cultivation in the mid-western U.S.A. the phosphorus content of the soil has dropped by thirty-six percent. Similar depletions have been observed in a variety of places.

The deterioration of land continuously depleted in this way is offset in part by the application of chemical fertilizers. Phosphorus, potassium and nitrogen are all produced with considerable expenditures of energy and in the first two cases are drawn from exhaustible, finite deposits. The use of these chemical fertilizers presents the added difficulty that, unlike organic nutrients which are released slowly, they are readily water soluble and have been known to leach away and upset the ecologies of streams and lakes.

Although needed in the greatest quantities, potassium, phosphorus and nitrogen are not the only nutrients diminished by export agriculture. Many trace elements are depleted in this way, but unless the situation becomes critical they are not missed – not missed, that is, by the agribusiness people. The plants miss them and respond by producing less nutritious food and by being more susceptible to insects and disease.

There is a qualitative difference between the energy released when fossil fuel is burned and the energy produced by the human metabolism. However, an interesting comparison can be made by measuring both in the energy units

called calories. A modern farm, like much else today, is worked by big machines. Between the energy cost of the fertilizers and of the machinery, it can take as much as twenty calories of fuel energy to produce a single calorie of food energy. This compares poorly with farmers in the Amazon basin who get sixteen calories of food energy back for the input of a single calorie through their own labour.

The big machines of modern agriculture require big fields of single crops to be practical. Unlike mixed-crop farming where parasites are isolated in smaller plots, if a disease or insect pest gets started in a field growing nothing but its favorite food, there is little that would stop it from multiplying rapidly. This factor and the increased susceptibility of chemically-fed plants make it appear necessary to use more chemicals to control insects and diseases.

This introduces a further problem. The use of an insecticide is often capable of killing most of the pests attacking a particular crop. A few of the insects having some resistance to the poison, however, live to reproduce. When their offspring are again poisoned a greater number survive due to their strong parentage, and they become a menace even sooner. Killing the ones that are susceptible to the poison and leaving the strong ones very soon breeds a strain of insects which need even greater concentrations of poison. Sometimes a different poison must be used or a different crop planted. In the meantime it is not unknown for the insects' natural enemies to eat the poisoned insects and be poisoned themselves, making the area even more hospitable to the pests. One case of this progression, among many, was a malaria eradication program in Guatemala. After twelve years of intensive insecticide use, mosquitoes were resistant to the chemicals and there were more cases of malaria than before the program started.

One more agricultural problem causing increasing concern is the spread of cities. For obvious reasons, settlements which started in good agricultural areas were the most likely to be successful. Many of them have now grown to be our big cities. The cities are expanding and each new road or row of buildings covers the best agricultural land and thus makes it unavailable for growing food.

ANY·SYSTEM!
·REQUIRING·A·CONTINUAL·
·INPUT·OF·NON-RENEWABLE·
RESOURCES·WILL!
EVENTUALLY·EXHAUST·
THE·SOURCE·OF·THOSE·
MATERIALS.!
FUTURE·DEVELOPEMENT·
SHOULD·BEAR·THIS·IN·
MIND·AND·WORK·TOWARD·
A·SYSTEM·IN·WHICH·THE·
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FOR THE STUDY OF
CULTURAL EVOLUTION"
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Pollution

We have looked briefly at the quantities of materials which are taken in to provide the food, shelter, tools and other things used by people. When these materials are processed there are often by-products which are thrown away and almost all of the finished products eventually are passed out of human control. To the extent that these materials disrupt the well-being of society and nature they are pollutants.

Most of the waste from pre-industrial humanity was of the sort that could be re-absorbed by the other forms of life, and consequently was not disruptive to the cycling of things. However, since industrialization we have been creating numerous materials which have never before been confronted by living things. At present as many as 3000 new chemicals a year are added to the hundreds of thousands that we have introduced in the past few centuries. Many of these make their way into the environment, yet relatively few have been examined for possible detrimental effects. Statistics have been compiled on maps to show how cancer and respiratory disease are more common around industrial regions and in particular around chemical industries, but specific pollutants are not always evident.

In recent years pollution has received a lot of attention in the media with the result that steps are being taken to clean up some of the more obvious problems. In other cases, the stubbornness of vested interests has outlived popular concern. How many pollutants go undetected is unknown.

Our waste products can pollute in a number of ways. There have been instances of living things having been killed outright by the discharge of manufactured poisons. And it has already been mentioned that fertilizers and human excrement produced in large quantities can upset established nutrient cycles. There is also the direct problem of automotive and industrial gasses mixing with moisture in the air and forming acids which corrode stone buildings and some painted surfaces, not to mention damage to our eyes and lungs.

Other materials accumulate over time and grow to be a problem. For example, one of the propellants used in aerosol cans, freon, has been released in hundreds of sprays from billions of containers. Freon is now present in the atmosphere

in such quantities that it is feared that its ability to break down ozone may pose a threat to the shield layer that filters out dangerous ultraviolet sunlight. Another such accumulation is due to our persistent burning of fossil fuels. The carbon which has for ages been bound into coal, oil and natural gas is, through combustion, being released as carbon dioxide. There has been a small though measurable increase in the percentage of our atmosphere which is carbon dioxide. The ability of CO_2 to retain heat has presented the question of what the continued accumulation of that material will do to our weather.

Another type of accumulation is the concentration of harmful materials in the food chain. In Minamata, Japan, small amounts of mercury were released into waterways over a period of time by local industry. The mercury was absorbed by small creatures which were eaten by small fish. The small fish retained the mercury taken in by all the creatures they had eaten. The larger fish that ate the small fish retained all the mercury that the small ones had collected. Since the people in the area ate the big fish, some of them eventually collected enough mercury in their bodies to cause serious illness and death. The so-called Minimata Disease has appeared in at least one part of Canada and there are many places on this continent where people are advised against eating local fish because they contain unacceptably high levels of mercury. The same food chain accumulation process has been noted with radioactive substances and who knows what else.

Note should be made here that the pollution of our lives is not always indirect. There is considerable controversy around the adding of various chemicals to our food. Many food additives are used for the purposes of enhancing appearance and taste or to lengthen shelf life. These uses are motivated by the desire to make money with little concern for the well-being of those who eat the food. The testing of these additives is often biased or inconclusive and should be of public concern.

The term 'pollution' is also used in reference to the degradation of our visual surroundings, noise and the assault of advertising on our ability to decide for ourselves. The adverse effect of these things cannot be substantiated as easily as physical damage to the life process and individual people, but there can be little doubt that they add stress and detract from the quality of our lives.

Population

> "An abnormal situation in ecology is one in which populations go up or down spectacularly... We are probably in the middle of the most drastic ecological upset in terms of magnitude and speed that has occured during geologic time."
>
> M.K. Hubbert,
> *Future Environments of North America*

All the problems mentioned above are aggravated by the fact that there are more and more people consuming resources and producing waste all the time. It is estimated that the human population reached half a billion around 1650. Two hundred years later we had reached the one billion mark. The next billion was arrived at in 1930 – only eighty years later. By 1963 we had reached three billion and in 1976, United Nations figures indicated that there were four billion of us.

Nineteen seventy-four was World Population Year; during that year many people were made aware of the situation that exists. North America and China have nearly brought the growth of their populations under control. Europe is not far behind, but most of the rest of the world has yet to balance birth and death rates.

In his text *Fundamentals of Ecology* Eugene Odum states that "in all ecosystems there is a strong tendency for all populations to evolve through natural selection towards self-regulation."

For countries with uncontrolled population growth there is the disturbing probability that they will eventually overburden the ability of the land to support their people. Even countries with stable populations may find that they cannot continually stretch agricultural production with subsidies of energy and fertilizers. Still, there are people who argue that the earth could support 15 billion people if resources were distributed more equitably. This may be true, but what is the point of testing the limits? With a variety of situations to watch, we shall see which are successful in providing people with a secure future.

Social Conditions

"Our ignorance is not so vast as our failure to use what we know." M.K. Hubbert

"Our only enemy is our unwillingness to adapt our pattern of living to our environment."

Raymond Dasman

The first sections of this chapter point out major problems which require that we make some basic changes in the way we are supporting ourselves on this planet. The character of our society, however, will make it difficult for such fundamental change to come about.

At the Citizens' Forum which accompanied the United Nations Conference on Human Settlements there was an enormous exhibition hall. Booths, tables and film theatres lined the complex of walkways. Thousands of people from around the world were displaying the results of years of work on problems related to agriculture, nutrition, community planning, appropriate technology, family planning, education and the like. What one could see by looking around the displays was that in the places where people applied themselves the problems could be solved. Furthermore, since the people who gathered at Habitat were mostly aware of the problems we face and were already applying themselves to some aspect of the task, it seemed as though everyone cared. It became clear that there was abundant cause for hope; we only have to apply what we already know. It was not until after the Forum dispersed that the problem of most peoples' lack of motivation again presented itself.

For the most part, from an individual standpoint, earning a living in the present system is quite confortable. For decades the productivity that provides for our needs has become increasingly automated and specialized. As a result, we have stopped making things for ourselves, preferring rather to depend on complex organizations and machinery powered by inanimate energy sources. To be a part of the mega-system we need only know how to perform one type of work. Once taught a specific skill we can do that one job in exchange for money with which to purchase the things we need to live and much else besides. As long as the machines have materials and energy to run on, and the price of goods doesn't rise above an individual's earning power, the situation

will remain comfortable.

There is only a small portion of society which understands the precarious position that this heavy dependency puts us in. For most people, it seems that some sort of shock will be necessary for them to go through the effort of exploring new ways of doing things. Judging from the return to normal after the first "energy crisis", it appears that the shock will have to be quite drastic. The question is: Will the critical conditions that seem to be necessary to mobilize people make the reformation too difficult to handle?

The purpose of education is to prepare young people to fit into and carry on their culture. Schools today are preparing their students to hold steady jobs doing some specialized task. Except for the relatively few planning positions there is little need for creative thinking. It is more important that employees remember what they are taught and that they be punctual. This training has not been without its reward. Indeed, the people who have passed through the education system have brought about remarkable progress in our society's goal of increased material production. In this new era, however, this same sort of education will prove a hindrance to adopting new values and to finding a new way of sustaining ourselves. Creativity and self-motivated initiative are needed in abundance to conceive and construct a new world.

Among the factors which perpetuate the present system and hinder change the most significant is probably the way in which our media are used, particularily advertising. In his book *Culture Against Man*, Jules Henry identified two new commandments for the modern age: "Create more desire" and "Thou shalt consume". When one thinks about how we learn to behave by watching what goes on around us and how much of our attention is caught by radio, television, billboards, newspapers and magazines, it is clear that media can have a strong influence on our lives. From the time that a child first lifts its head off of the rug and is fascinated by the moving light of the T.V. screen it is subjected to the message that for it to be successful and happy it needs to have things. It is no wonder that we have a highly materialistic society.

·HELP·BRING·BACK·
·THE·FUTURE·
·WASTE
·CONSPICUOUS
CON.SUMPTION
·PLANNED
OBSOLESCENCE
·OVERPOPULATING
·CREATING FALSE
NEEDS
·INADEQUATELY
NOURISHING CHILDREN
·NOT CARING
·STOP·CRIMES·AGAINST·
·POSTERITY·

A second detrimental influence of T.V. in particular is the exposure to violence. I was confused one day when a three-year-old where I was visiting started to beat me with his fists. After spending the morning with him, I asked if he was trying to be like the superheroes we had been watching. With a grin and a punch my guess was affirmed.

It has also been speculated that T.V. is responsible for the lack of patience displayed by many people today. Our individual realities are the product of our experiences. Considering that for an enormous number of people the majority of situations that they experience from inception through climax to conclusion take place in a half hour or an hour with time out for commercials, it is no wonder that they find it hard to take on projects that take days or weeks, not to mention years.

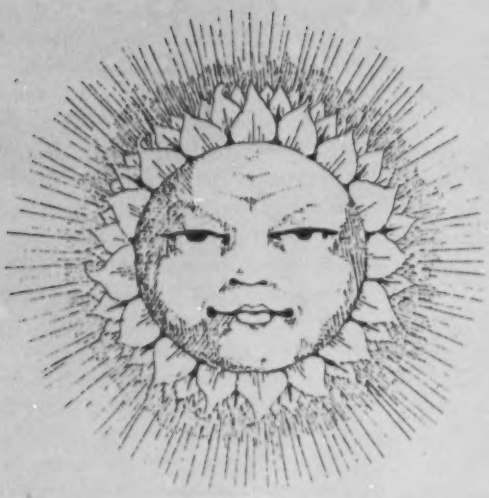
Another problem that we face today is the increasing concentration of our population in urban areas. In the introduction to Barbara Ward's book *Human Settlements: Crisis and Opportunity*, it is stated that: "Urban settlements are growing twice as fast as population. The big cities of over half a million are growing twice as fast again." When population is very dense an individual's experience tends to be almost entirely involved with other people and human artifacts, to the exclusion of the natural world. In a city, where goods and food come from store shelves and end up in garbage cans or the sewage system, it is hard for people to be aware of the impact their lives have on the world around them. Ignorance does not alter the fact that, if in the course of producing an item or of discarding it after use, resources are wasted or toxic materials are released into the environment, the consumer is responsible. The responsibility is shared in part by the producer who often uses persuasion to get people to buy things, but, in the end, without the consumer the goods would not be produced.

The larger a city the more likely it is for people to get caught up in it. There is no doubt that masses of people are capable of some extraordinary works. Immersion in such works has the dangerous effect of causing many people to feel that if we can put a person on the moon, for example, we can do anything. There is a widespread feeling that if something is going wrong that a bigger and better machine

will be built and the problem will thus be taken care of. Such technical fixes, without some measure of responsible action from the populace, are unlikely to provide lasting solutions. Kenneth Stunkel, an associate professor of History and Governments, observed: "The conviction that technology can and will shelter mankind from disasters of his own making is one of the contemporary world's most persuasive and dangerous myths".

As a community gets larger not only are people removed further from the source of their sustenance but they also have a correspondingly smaller role in making the decisions that govern their lives. Similarly, the mass situation makes it increasingly difficult for people to find a job in which they can feel that their contribution to society is significant, that they are needed and not just expendable factors of production. In the mass society if a person needs help he or she receives it from institutions that deal with so many cases that it is exceptional if personal care is involved. When a society cannot care humanly for its people, the people tend not to care for their society and the quality of their work drops. Whether for reasons such as these or other factors not mentioned, it has been recognized that the incidence of mental problems rise with the density of population. The more people are mentally disturbed the less they are able to contribute to the task which faces us.

What is outlined in this chapter is a more serious threat to our well-being than an invading army. If an invasion were totally successful, some people, perhaps many, would have died in the resistance, and those who survived would probably lose their collective self-destiny and would have to work harder for less. But this would be a small price compared to the disaster that will befall us if we are unable to adapt our culture to the life-processes of the earth. Even though custom and momentum persistently and almost unnoticeably carry us in the traditional direction and many people find it difficult to consider new possibilities when their immediate lives have them preoccupied, the problems mentioned here have to be dealt with. If we are not the ones to work on them, who will? It is not inevitable that we be swept along by the times. Any individual is capable of perceiving the problems and of taking steps that will help alter present trends. If we can maintain our resolve to keep taking such steps we can break out of the vicious circle that threatens us. Bakavi is a symbol to identify a way out of the difficulties we face. Through use of the word we can recognize others who agree that Bakavi is a desirable direction. With that recognition we can give each other the mutual reinforcement and aid that we need to take on the reformation.



The Sun gives without expectation,
neither does it judge.
Whether or not human beings
make use of its gifts
is of no concern.
Cultures and species come and go,
it's all the same
to the Sun.

Bakavi

> "Humanity is seen not as the outright owner of the world or any part of it, but rather the holder of a life rent, and bearing the responsibility to so order his activities that he turns over to his successors the biological capital with which the world is endowed in at least as good condition as when he got it."
>
> Ian Cowan,
> *Future Environments of North America*

The core purpose of this book is to present a device that can help us work our way out of the problems described in the previous chapter.

The device is the word 'bakavi'.

For as long as people have used language our vocabularies have been expanding. Whenever someone has become aware of some concept or thing and has wanted to represent it in discussion with others there has been the tendency to introduce new words. Once a symbol was established it became much easier to communicate about the topic in question. In a way it is like explorers making maps in uncharted territory. Whereas the explorers face many trials and errors as they investigate different land formations and waterways, anyone who wants to go to any of the charted points after the first work is done need only take his or her bearings and follow the maps. So it is with ideas. Once an idea has been developed and labeled others need only understand the symbols used and the idea is theirs.

For several years before the coining of 'bakavi' as it is used here, the author investigated what different people felt was necessary to make the future look more promising – to bring humanity to peace with itself and its environment. Since different people focused their attention on different aspects of the current problems there were many ideas about how to solve those problems. After a while, however, it became evident that although most of the people who thought about solutions were beginning from various orienta-

tions they were working toward what was basically the same goal. The directions indicated were condensed and abridged to produce the definition to which the word 'bakavi' has now been applied.

As described in the introduction, the word 'bakavi' originates from the tradition of the Hopi Indians. After the third cycle of having their civilization destroyed as a result of ignoring the natural processes which make life possible, the survivors were determined not to forget again. While rebuilding their culture this time, the Hopi established ceremonies to accompany the cycles of the seasons and to remind them of their place amidst the universal laws of life. Over the centuries their dedication to remembering this connection has made their culture, of itself, a symbol of human integration with nature. It is appropriate that a word has come from this background to represent a direction in which we can work to re-integrate ourselves with the life process.

The objectives which Bakavi has been chosen to represent are the following:

To develop an ecologically sound way of supporting human life; that is, one in which materials are managed in continuing cycles and the energy necessary to advance those cycles is taken from continuously reliable sources.

To encourage life-based pursuits. These would include: interpersonal relations, creativity, co-ordination, appreciation and spiritual, intellectual and psychic development.

To develop toward technologies which do not:

1) Require a continual input of non-renewable resources
2) Have a cumulatively degrading effect on the environment
3) Require more material than would be available if the world's resources were equitably distributed amongst the world's people.

It is worthwhile here to comment on "Life-based Pursuit". When we have accomodated ourselves to the material world to the point that we are fed and sheltered, the question arises of what to do with ourselves. Life-based pursuits are those which are open to us because we have the human potentials of body, mind and spirit. In comparison

with the consumption or accumulation of material goods, life-based pursuits have a distinct advantage. If we consider the finite quantities of resources available on our planet, it becomes clear that when one person takes more than his or her fair portion it becomes impossible for someone else to have as much to live with. On the other hand, if we choose to satisfy our ambitions by inner growth and the development of skills we can greatly reduce the need to compete for limited resources.

It is also true that, while material accumulation tends to encourage competition, when someone develops his or her human potentials, such an example makes it easier for others to grow in the same way.

By focusing our wish to grow on life-based pursuits, the available material resources can be managed rationally to provide a continuous supply of nourishment to grow and maintain our bodies in health, and materials to build and repair housing in which we can move and think freely.

There are also comments to be made on the criteria for judging technologies within the Bakavi framework. The points about exhausting resources and disrupting the environment are obvious. The third point is sometimes debated by people who do not acknowledge the moral and practical desirability of equitable resource distribution. Arguments for taking what we can and ignoring the needs of others can be countered by pointing out that increasing numbers of countries are becoming capable of using and defending the resources within their borders. The result of this may well be equitable resource distribution maintained by a new balance of power.

We must also consider that the population explosion is still out of control over most of the planet. Obviously, an ever-expanding population would mean an ever-diminishing amount of resources per person, a situation which cannot endure. In judging what quantity of resources would be legitimate for us to use, we must estimate at what point the population would stabilize if we are still civilized in fifty to one hundred years. Perhaps we would do best to think of the minimum that could provide for our needs.

What is the Purpose of Specifying the Bakavi Framework and Giving it a Name?

The purposes behind the effort to introduce this framework for development are not complicated. Specifically, there are only two.

1) Education: to provide people with enough information about Bakavi principles to enable them to judge the desirability of such a system for their lives.
2) Organization: to help people who agree with Bakavi to recognize each other so that we can establish the alliances necessary to be more effective in the preparation and work which lie ahead.

There are several ways in which Bakavi can help toward these goals. First of all, there are many people who are still unaware of the situation which concerns this book. The different elements relevant to that situation are contained within the Bakavi statement. When people who were previously unaware read the principles of Bakavi, it can start them thinking and may eventually lead them to contribute to the task which faces us.

There are also many people who have followed the news over the past several years and have a growing feeling that change must take place. For such people a clear statement of direction can help bring their intuitive feeling to conscious recognition. Once there is a clear recognition of the needed change it is possible for people to apply their will to constructive action.

By taking the word 'bakavı' to represent this framework for development, it becomes possible to think and communicate with it quickly and easily. When we inherit a language the words we receive define the areas in which we will be inclined to think. Introducing the word 'bakavi' into the language should increase the tendency for people to consider its possibilities.

A fourth way in which Bakavi can help is through the identification of others who share its principles. There is a tendency for people who realize the need for change to feel frustrated at the mass and inertia of society and their own limited ability to influence society's direction. All an individual can do alone is apply the values of Bakavi to his or her own actions. Ultimately, individual action is where the

change must come from, but it doesn't seem worth the effort if one feels isolated. With identification through a common statement of principles, individuals can recognize that they are far from being alone in their concern. Association with allies provides mutual reinforcement for adapting personal behaviour, and an exchange of ideas about how to develop a bakavi way of living. In the end teamwork results when specific projects are recognized.

Finally, Bakavi could prove valuable for organizing collective action. It is difficult to lead a bakavi life in a system that was built in accordance with a different set of values. Changing the system that supports us or building new ones will take amounts of capital beyond the means of most of us. Many of the people who are devoting their time and ability to developing appropriate technology and encouraging life-based pursuits have to use their own earnings to finance their work and are consequently held back in their efforts. It doesn't have to be that way. Almost everything we earn and spend is taxed, and that money is used to nourish the growth and maintenance of our society. If enough people were to clearly state that they feel we should adopt a bakavi direction for our development, some portion of our tax money would have to be used to that end.

Theory

There have been some theoretical considerations for introducing Bakavi in the manner presented here.

One of these considerations comes from the role which myths play in society. A myth is a narrative that presents part of the beliefs of a people, or explains a practice or natural phenomenon. After such a story becomes a part of a person's background of experience it can serve as a reference to help the individual understand the events which he or she witnesses. In this respect Bakavi is a myth. The meaning of the word as used in this book combined with the explanation earlier in this chapter and the story of the word's origin from the introduction present a frame of reference. Once these images have been taken in they will come to mind and emphasize the significance of related events as they unfold.

Another thought is that adapting the Bakavi guidelines for our culture, or even establishing bakavi systems for the people who recognize the need for them, cannot take place through centralized direction. A government can provide tax incentives, encouraging interest rates for appropriate construction and money for research and development, but any legislation aimed at implementing the necessary basic change could not be sensitive to the individual circumstances of the people involved, and consequently would meet with much resistance. Of necessity the initiative for the change will have to come from individuals and groups of people who can work in direct contact with their particular situations.

Look at the history of industrialization in North America. There was no central plan for development beyond the establishment of communication and transportation systems. When Europeans came to this continent they brought the knowledge of fossil fuels, engines and machinery. This knowledge combined with the economics of mass production was to provide abundance for all. Works arising from individual initiative and based on commonly-held principles, resulted in North America evolving as we know it today. It is the same manner in which a bakavi culture must evolve. We are aware of the guidelines within which we can support our lives. It is up to each one of us to make our part of society fit within those guidelines.

Bakavi can also be looked at as an influence in the noosphere. In the way that "biosphere" is a term to identify the interrelated layer of life around the planet, "noosphere" refers to the layer of consciousness. The noosphere consists of all feelings, thoughts, perceptions and ideas that come from living things, particularly humans. Change in the noosphere happens as a result of the interactions between conscious beings. The influences involved happen both directly by means of communications between people and indirectly where ideas, thoughts, perceptions and feelings have a subtle influence on the things people do and say.

When something is to be accomplished it is initially conceived in the noosphere as the result of various perceptions and ideas coming together in someone's head. The actual creation, then, involves going through the physical procedure to achieve the desired result.

An individual's ability to create is governed by his or her imagination, will and physical limitations. The immense task of re-shaping our culture to harmonize with the life process is far in excess of any individual's ability. However, if circumstances have made the noosphere fertile and a framework such as Bakavi is seeded widely enough, a mental climate can develop where many people will conceive actions that collectively could have a significant effect on the problem. Indeed, this process, as it relates to the topic of this book, has been underway for a considerable time and has spawned many works. This book itself derives from that source and is written with the acceleration of the process in mind.

The problems are here for us to see and the principles of Bakavi have been spelled out, but where do we start?

First, we must get an idea of how we fit into the picture. Since our life-based activities are not a part of the problem, here we need only to look at the things that we bring into our lives to use and enjoy, and try to answer these questions: What materials are they composed of? How much of these materials are available? Could the goods be made from other materials? What materials are used in production that do not appear in the products? Where do the resources involved come from, and how extensive are the reserves? How much energy is needed to transport the raw materials, to produce the goods, and to deliver them to retailers and finally to us? What becomes of any by-products of production? What will become of the goods when we are finished using them?

There are many questions, especially if we are considering, for instance, an automobile with its hundreds of parts and its supporting roads, service facilities, parking spaces and so on. Even so, if we want to know to what extent our way of living is bakavi these are the kinds of questions which must be answered. Our task is to find those factors in our way of living which cannot be maintained within the Bakavi framework. Once we have some understanding of this, the next step is to find alternative ways to provide for the things which do not fit within the limits.

At this point we will confront our greatest obstacle: the tendency for people to feel that what is normal in their culture is natural. The result of this feeling in an unwillingness to consider living in another way. Our relationship with gasoline-powered vehicles is a vivid example because of the extent to which we are dependent on them. We have grown completely accustomed to this mechanical aid.

In spite of the evidence that the fuel for these vehicles will be all but gone within a lifetime, few people put any thought to how we could live without them, or, indeed, would even think it possible for such a situation to come about. However, there are places in the world where people live almost entirely without automobiles. Some visitors from a village in El Salvador, when asked how widely internal combustion engines were used in their community, explained that there was only a bus that drove to the capital each day. As incomprehensible as this way of living may seem to us, it is perfectly normal to the people who live there. There are numerous other aspects of our lives ranging from the preparation of food to providing entertainment which we are accustomed to handling in certain ways here but which are dealt with differently in other parts of the world.

If we are to consciously re-design our culture, it is absolutely necessary that we gain the cultural perspective to realize that the way we provide for ourselves can vary greatly. Some people recognize this fact as a result of spending time in other cultures with distinctly different customs. Other people are able to gain this view within one country if they have the opportunity to live with people of different backgrounds and classes. In either case, when two or more ways of supplying food, shelter, utensils or anything else have been witnessed it is possible to compare the techniques and find the essence of what is being provided. So long as the need is satisfied, the method employed should be adaptable. In developing a bakavi culture the procedure would be to consider the essence of the needs we want to satisfy and, with regard to the principles of Bakavi, either select an appropriate cultural form from an existing society or design a new one specifically for our unique circumstances.

What can an Individual Do?

Whether through a process like the one described above or through the application of common sense and intuition, we can start to get an image of how we will be able to live in the future. To bring this future about there are three possibilities for action:

1) You can work on yourself; that is, develop a personal life-style which is increasingly life-based and which requires a minimum of material consumption. This also includes developing skills which would be of use in establishing and maintaining a bakavi community.
2) Break away from the mainstream of society and work on a scale in which individual labours can shape the systems on which individuals are dependent. Or, if departure is undesirable:
3) Organize within the mega-system with the objective of mobilizing enough people in political statement and action so that the development of the mainstream of society will be influenced in a bakavi direction.

The first possibility of developing a bakavi way of living is fundamental to pursuing either of the other possibilities. An individual deciding to take a walk in the park rather than driving somewhere inclines the culture in a bakavi direction, as does buying goods with a minimum of disposable packaging, recycling newspapers or repairing something instead of buying a new one. The more that people make such decisions, the easier it will be to establish a stable material system to provide for us.

Situations will arise where one will have the urge to do something in spite of the fact that there are other activities which are more bakavi that could be done instead. To avoid discouragement it is important to understand the difference between intellectual agreement with the Bakavi principles and the changing of our accustomed behaviours. It is easy to decide consciously that Bakavi is a desirable direction. Accustomed behaviour, however, consists of a lifetime of habits and generations of example. Only a portion of our actions are rationally conceived: The rest arise from habit which will take time to change.

Even when one has decided that one wants to live in a bakavi way, internal conflict may arise between inclination and conscious will. One must be careful not to force the situation or to punish oneself. If a person is sincere about wanting to make the change, it is best that he or she observe the conflict and flow with the circumstances. Better that a continuous gentle pressure be applied than for absolute measures to be taken that may be too disruptive and end in resentment and abandonment of the effort. This is not to suggest a lax attitude but only to recognize that changing our behaviours is an involved process in which we must be patient and persevere.

The second option, of breaking away and becoming a part of a system in which individual efforts will have a direct effect, is being taken by a growing number of people. There are intentional communities being formed all over North America and on other continents as well. Such endeavours are ambitious in that, for most of the people involved in them, they present entirely new situations. There is little in our mother culture to prepare us for working and living closely with others to provide directly for each others' needs. Many attempts have broken up because of the unfamiliar circumstances. The experience gained in the process, however, better equips the participants for future attempts. Many of them do try again and as a result there are many communities that seem to have successfully passed through the initial cultural shock. For others wanting to do the same thing, existing communities provide an encouraging example and are able to point out pitfalls and suggest techniques to overcome them.

Parallel with the preparation of this book has been the planning of a project to build a village-sized settlement on Bakavi principles. Discussion about this project is, however, something that must take place through personal contact and, at present, is only relevant to people who are prepared to live in the Ottawa–Toronto region.

The third possibility is that of organizing. The restructuring of our established settlements and the larger systems of which they are a part is an endeavour that can only be brought about by a great number of people working in a common direction. There are millions of people who are now supported by systems that are precariously equipped to

deal with the future. Personal ambitions are extremely varied but we share the need of continued life if we are to realize those ambitions. On this common ground we can all agree that the adoption of a bakavi way of living is of mutual benefit to all of us – except those whose personal ambitions contradict the Bakavi principles.

Bakavi is particularily well suited to help people organize. When people are confronted with the Bakavi question, as seen on the back cover of this book, the reply often is: How could anyone disagree? Indeed, how could anyone familiar with the circumstances we are in today disagree with Bakavi? Why then are there not national plans for reorientation to meet the problems? The answer to this last question is that this commonly held sentiment has not yet been verbalized by enough people to make an impact, and those who do express their concern do so in such a variety of ways that it is possible for what they are describing to be mistaken as different issues.

In an experience several years ago, the author had the opportunity to confront a prominent Ontario politician with a question about how the Ontario Government was going to meet the responsibility of helping the people of the province to prepare for the time when resources, particularily petroleum, would no longer be abundant. The question was sufficiently complicated that the skilful politician had no trouble slipping by without committing himself. In the future, if we can manage to have Bakavi popularly understood, the question could be put to the people directing society in a way that would be difficult to evade. How can we introduce Bakavi to the millions of people with whom we share the future? It seems that this could be accomplished by conducting a plebiscite.

Plebiscite

Going strictly by the dictionary definition, a plebiscite is a vote of the people on a proposal officially submitted to them. However, there is no way to stop us from stretching this definition (or perhaps returning the word to its original use?) and conducting a plebiscite by questioning the people around us without expending the time and effort working for an official submission. Any of us can take the Bakavi question and ask people if they agree with us.

Whether the question is asked face to face or through literature, posters, editorials or other media the results will be similar. When people are asked if they agree with something, they have to consider how they feel about the question. Just to have people think about Bakavi is worth the effort of asking. In addition to stimulating people to think about the issue, asking the question also introduces them to the word Bakavi and its meaning. As described in an earlier section of this chapter, this leads to the possibility of people gaining a conscious recognition of the change in direction we must take and being able to think and communicate more easily on the topic. Furthermore, when people do identify their agreement with Bakavi they will have the moral support of knowing that there are a great number of people who feel the same way.

You are encouraged to help with this plebiscite by introducing the Bakavi question to your friends and relatives as well as to people you meet or work with. If you know of a publication that would carry the question or any other media through which it might be asked, it would be advantageous to provide them with the necessary material. Along with the basic question, this material should include an address, either your own or the Bakavi address, to which people could write if they want to make contact.

We should not underestimate the value of bringing this question to the attention of people holding political positions. This applies especially to political candidates when they are busy telling us how well we will be represented if we vote for them. If the issues of this book concern you, ask your prospective representatives if they agree with Bakavi. They will only be able to dodge the question a few times by saying that they don't know what it means. See to it that they do know and they will have to respond. If the apparent popular agreement with Bakavi is not an illusion, we can ask of our respective governments no less than a clear statement of policy to pursue a bakavi future.

It is possible that some progress will come through established political channels. And while we should not let opportunities to work within those channels slip by, we will do well to recognize that we have the ability to adapt our communities directly through our own labours. It has been by the labour of people like ourselves in co-operation with

each other that our entire civilization has been built. In order for us to see the ways in which we can co-operate on the task at hand we need to know about each other and each other's skills. To this end there is a contact address for people agreeing with Bakavi. The address is: Bakavi
P.O. Box 2011
Station 'D', Ottawa
Ontario, CANADA

It must be understood that except for co-ordinating a public statement of agreement, a central address is of limited value. For the people around Ottawa this address will seem much more relevant than for people across the continent or beyond. This is due to the fact that people in Ottawa can work directly with others nearby but are restricted to mail as the distance increases. Nevertheless, when we do receive mail from people elsewhere, we endeavour to introduce them to others from their area from whom we have heard.

Eventually, it is hoped that in different areas where people sharing agreement with Bakavi get together, a local address will be established to which people in that vicinity can respond. Contact need only be maintained with the Ottawa address so that, if through this book or other means we hear from people in areas with a local association, we can make appropriate referrals.

The living situations which we will be developing to support our futures must be tailored to local conditions, and therefore have to be worked on by the people to whom those conditions are familiar and who will eventually live from what is devised. To the extent that we can benefit from each other's experiences we will maintain the Ottawa contact address.

If indeed the problems mentioned in the earlier chapter are real, we must solve them. The greatest potential that humanity has for solving these problems will come from a cooperative effort on the part of those who care. Bakavi is a device designed to help with this effort. Can you make it work?

> "Nothing in the Universe can resist the converging energies of a sufficient number of minds sufficiently grouped and organized."
>
> Teilhard de Chardin

Values

Most people want to be good. Unfortunately, however, there is some confusion about what is right and what is wrong. It is impossible to prove rightness or wrongness without bringing in qualifying information relating the situation in question to some outcome which is assumed or agreed to be of value.

In essence, Bakavi is a system of values. It defines as good those things and actions which fall within its guidelines and implies that things and actions outside of its framework are bad. As with any other system of values, Bakavi is based on the assumption that a desirable outcome will result from adhering to it. The point that must be taken on faith is that it is desirable for our civilization to be able to provide secure shelter and food supplies for the human race throughout our lifetimes and for generations afterwards.

It would seem an easy matter for there to be concurrence on this, but alas, we are the victims of complexity. This point can be made clear by considering the difference between morals, mores and self-interest as presented by A. McLung Lee in his text *Principles of Sociology*. Morals are

identified as being values concerning behaviour that is appropriate to the well-being of society as a whole. In other times society was of a size that was comprehensible to its members, and the connection between social well-being and that of an individual was easier to see.

Mores are values concerning behaviours that are beneficial to a particular social group, but not necessarily to the whole of society. As our societies expanded, the various sectors grew to the point where people could become almost totally involved within the single sector in which they worked. Professionals, labourers, industrial managers, farmers and consumers, to name a few, have different interests.

When people become so alienated that they no longer understand that their well-being is to a large extent dependent on the well-being of society as a whole, immediate self-interest becomes the value on which they base their actions.

Because mores and self-interest do not take everything into account, there are many points in which the different value systems contradict each other. Almost all conflict can be traced back until we find that the opposing sides differ in what they value.

For example, the directors and the shareholders of a company that manufactures consumer goods may agree that it is desirable to provide reliable employment for their workers and to generate a continual profit to expand the operation and to remunerate those who shared in establishing the company. With these values it is beneficial to make an item so that it will wear out and need to be produced again. On the other hand, the user of the product may value a minimum expenditure of his or her money and the conservation of the materials and energy used in making any item. With these values it is good for a given item to be durable. Obsolescence and durability are obviously contradictory characteristics, but within the appropriate systems of values they are both desirable.

Other contradictions can be seen in the ways a forest is regarded by bird watchers and paper manufacturers, or in the different attitudes which food producers and land developers have toward the land around our cities.

These differences and many others are so widespread that much of our ability to cope is lost as we work against one another. Given the serious problems we are faced with, we

can ill afford to lose any of our potential. If we are to overcome the problems that threaten us, it is time that we look closely at our collective life on earth and recognize the values which are vital to our common well-being.

It is one thing to agree with values by which to assess our activities in the world around us, but what about the values which underlie our personal tastes, our likes and dislikes? Often when one becomes aware of a way of living which would be beneficial to the overall good, or even to one's own personal well being, there remains the reaction: "But I like to do things the way I have been doing them".

To what extent are our likes and dislikes the product of our conscious selves, and to what extent are they influenced subconsciously or from outside ourselves? What role do the tastes of the people we have grown up with play in our own preferences? Are we receptive to the values propagated through the media? How seriously should we take our impulses?

These questions are mentioned here as food for thought. If we are to consciously evolve our culture we must also be able to consciously evolve ourselves.

Consider this account from a young man who went to live on a small farm:

Brussels Sprouts

"I don't know what it was about those dark green baby cabbage-like sprouts, but when I was a child I detested them. Just the sight of two or three on my plate would cause my mouth to dry up, making the obligatory task of eating them an unpleasant ordeal. So for many years, brussels sprouts and I were not friends.

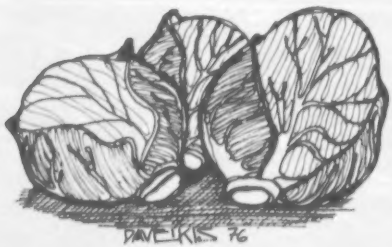
"Years passed and I found myself helping to prepare a garden. Among our seeds were brussels sprouts. Over the summer I watched to see where the evil entered the plant, but all I saw was the earth, the air, water, the sun and our own labours of cultivation. As harvest time approached, I began to trust the plants.

"Another factor was to influence my reintroduction to brussels sprouts. I had become responsible for my own nutrition. On reading some literature about how to optimize health by eating right, I discovered, among other things, that those nasty brussels sprouts were loaded with vitamins and minerals and would be a definite plus to my well-being if I could make peace with them. The alternative of developing the skills and facilities for synthesizing or refining vitamins or of being forever dependent on a vitamin pill manufacturer seemed less feasible than re-orienting my tastes.

"The day finally came when the first little sprouts were picked off the mother plant, steamed and served at a meal. At first came the rushes from the miserable meals of my memory and then the logic of the sprouts' desirability. The harmlessness with which the plant had grown convinced me that I had nothing to lose by eating them.

"The first few times that I ate the sprouts after that, I had to remind myself that I liked them, but before long my reaction was to identify their taste as good. Ever since when our paths have crossed the encounters have been pleasant."

This process of consciously shaping oneself can be applied to many things. Almost everyone has tasted something for the first time, found it to be unusual and perhaps shied away from it, only to find later that they develop a taste for that food. The same can happen with things to wear and ways of doing things. What we like or dislike is up to us if we care to exercise control over that part of ourselves.



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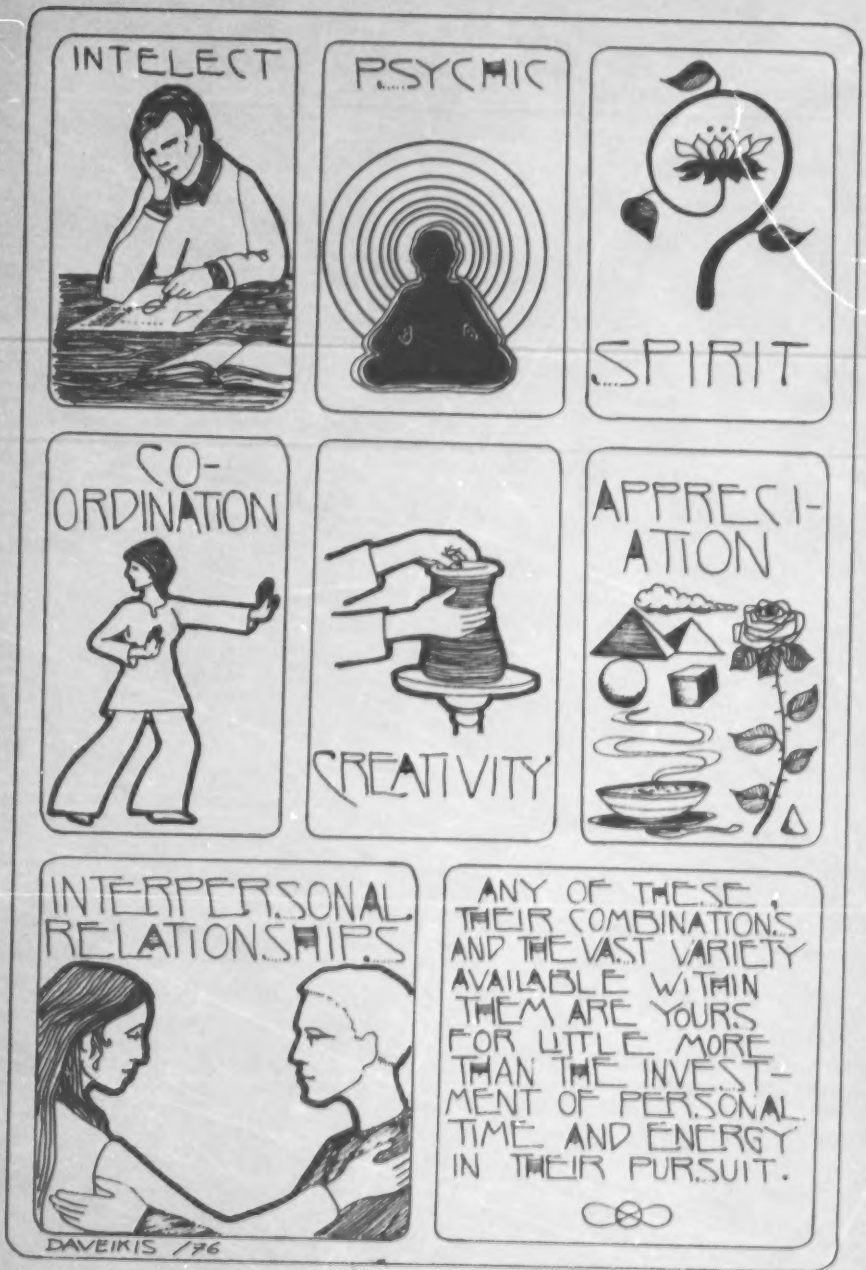
INTELECT
PSYCHIC
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INTERPERSONAL RELATIONSHIPS
DAVEIKIS /76
ANY OF THESE, THEIR COMBINATIONS AND THE VAST VARIETY AVAILABLE WITHIN THEM ARE YOURS FOR LITTLE MORE THAN THE INVESTMENT OF PERSONAL TIME AND ENERGY IN THEIR PURSUIT.

Life-Based Pursuits

Bound up, as we are, in physical bodies, it is necessary that we work with the material world to provide the food, clothing, shelter and utensils that we need to maintain our lives. However, once the basic necessities are provided for, we are at liberty to choose the way that we want to live our lives.

It is fundamental to a Bakavi way of living that we pursue life-based activities. What are referred to here as life-based activities are those which can involve our attention and the talents which are inherent in being human, without requiring a great amount of materials or external energy.

These include appreciation of what we find around us, the ability to move and to make things; the development of intellectual, psychic and spiritual potentials; and the joy, fascination and revitalization of relating with other people.

Almost all of us have the full complement of 206 bones, 392 muscles, and an intricate nervous system coordinating all of the parts. We also have the senses for sight, hearing, taste, smell and touch which provide contact with the world around us, and minds with the amazing capacity to remember what we perceive, to compare perceptions, to think and to project future possibilities. On top of this we have a continuity of awareness by which we can identify ourselves: to see over time how the world changes and to see how our own beings change.

The multitude of things that we can do as a result of being human can make our time on earth a stimulating and satisfying experience. This section will look briefly at the various areas of activity from which we can derive satisfaction without putting a strain on the systems of the planet which makes it possible for us to live, and without making the lives of other people more difficult. In fact, as was mentioned earlier, if these activities have any affect on others it is either by adding beauty or convenience to their lives or by helping them grow in a similar manner themselves.

Life-based growth is not without cost, however. The cost of developing human potentials is effort. The extent to which people are willing to exert themselves and to focus their effort on some activity will determine how effective they can be in these pursuits.

Appreciation

Perhaps the simplest satisfaction anyone can experience is appreciation. Appreciate what the senses perceive: musical notes, rhythm, sunshine and wind, the mystery of infinite space and the eccentricities of people can all be appreciated for their uniqueness and the wonder of their existence.

Even those things which are not as good as other things which we have experienced can be appreciated. For example, if someone eats supper and thinks that it is not as good as supper last night, that person is not likely to be as content as would have been the case if comparisons had been dispensed with and his or her senses were focused on the unique flavour and texture of the meal. This is not to ignore the possibilities of learning from experience in order to improve the way things are done in the future. Such objective comparisons can be made without feeling unfortunate to be eating a meal that is not quite the same as one remembered.

There are definitely things in this world which are wrong and should be changed. We can be aware of those things and direct our abilities to making them right without dwelling on their unpleasantness. How one person feels affects others. If we get caught in a cycle of feeling badly about things, our potential for positive action is diminished. On the other hand, if we occupy our senses with the beauty all around us we will feel better and do better work. The world we are seeing remains the same; all that changes is the quality of our lives.

Coordination

Coordination is the refinement of our ability to use our bodies. When a baby is born it has almost all the muscles, bones and connecting nerves that an adult has, but its control over them is almost non-existent. In the first years of life a child invests a great deal of effort in getting to know its body, exercising and strengthening its muscles, and learning which muscles move which parts. There is a great deal of motivation

for this type of development until the coordination has been achieved for walking, talking and manually arranging things.

After basic coordination has been achieved, further development of this aspect of ourselves depends on what we would like to do. A person might decide that he or she wants to manage an apple orchard. In order to get large juicy apples from the trees year after year, it is necessary to develop the skill of pruning. After learning the basics of which branches to remove and where to cut them, this knowledge needs to be applied to actual trees. At first, using the saw and clippers will be awkward and tiring but with practice the required movements will become familiar and the muscles used will get stronger. Also, with experience, decisions about where to cut will become second nature. Before long, when the trees need pruning the individual will need only to eat a hearty breakfast to be equipped for the job.

As well as for doing any other physical work, the same procedure can be used to develop the skills for dancing, playing sports and making music. Any new action will be uncoordinated at first, but the connections between the brain and the muscles can be learned and made familiar so that the body can be called on to perform the desired actions at will. To develop proficiency in any activity requiring co-ordination, particular motions or series of motions can be singled out and practised repeatedly until they are perfected. When motions practised in isolation are used in a normal performance of the particular activity they come easily and can be of great satisfaction to the person doing them.

Physical activities have the added advantages that they can stimulate the body and appetite and cause sleep to be sounder. Hatha Yoga is a type of coordinated exercise that has been developed specifically to help the body loosen up and keep its internal workings in good shape. Good health is perhaps the greatest pleasure available to people. Not only is it satisfying in its own right, but it also makes it easier to pursue any other activity that one might choose.

Creativity

There are few experiences that compare with the thrill of creating. Human beings have the ability to imagine something and then by working with the world around them can

cause what they have imagined to become visible to other people. This ability to create is as evident in making music as it is in preparing a meal or building a home.

Like anything else that a person might want to do with his or her being, creation requires that he or she put effort into it and practice. If one's education did not include an introduction to materials and tools, it helps to have someone who is familiar with these things demonstrate how to use them. Otherwise, familiarity can be gained through trial and error. Once the materials are understood and the tools known, one need only determine which to use, bring them together and get on with it. There are, of course, restrictions on materials both as defined by Bakavi and within personal accessibility, but for an enormous range of projects the materials are available.

The availability of materials is seldom as great an obstacle as having been told or imagining that one is not creative. It is of primary importance that such discouragements be forgotten. One need only use his or her imagination and shape the materials to match; or, as the material is being worked, let its properties suggest the form it is to take. The finished product will never be exactly as originally conceived, but its existence is evidence of interaction between the creator's mind and the material world. The more one works with a given material the closer his or her creations will approach the original imaginings; or, perhaps, it is that imaginings will come closer to what the materials can be made to do. Anyway, like so much else it gets better with practice.

Creativity also has the practical result that once people are familiar with the process of making things, the same process can be applied to making many items that may be needed by the individuals and their friends. This application of creative skill increases self-reliance and results in personal satisfaction and security.

Intellectual Development

The fact that you are reading this book indicates a highly refined ability to sense and assimilate information. Every bit of effort used in reading, talking with people, looking around or using any other senses to gain information builds an individual's inventory of knowledge. When a quantity of

information has been accumulated about any particular situation, the intellect can compare what it has learned and look for similarities and differences. Often it will detect trends which enable it to predict likely developments in what it has been observing. When sufficient information has been considered so that a situation is no longer surprising, a feeling of understanding arises.

Some people put a great deal of effort into exploring different aspects of the world around them just for the satisfaction of understanding. It is characteristic of this kind of growth that the more one knows the easier it is to learn still more and to develop understanding in new areas.

Besides the satisfaction of understanding and being able to help others who want to understand, the intellect is the basic tool for solving problems. Any difficulty that comes up in a person's life can be dealt with by learning as much about the difficulty as possible: what the component factors are, how they came about and what the possibilities are for altering them. It then remains for the mind to consider the different actions that could be taken and to contemplate the effect that those actions would have. Finally, the person involved can experiment with the actions that seem most likely to bring the desired solution.

This process requires only that personal effort be invested in proportion to the complexity of the problem. The process is similar for fitting the various items of a lunch into a lunch pail or for getting the wind to power a washing machine as it is for dealing with the social and economic problems facing us. However, in the latter case, although the abilities of a large number of people could equal the magnitude of the problem, there is the further complication that there are other people using their energies to keep things as they are.

Children would be well-equipped for their futures if, in addition to being filled with specific information, they were to get plenty of exercise for their problem-solving abilities. Their topic of study is of little importance. If their curiosity about any subject is enough to motivate them to exercise this part of their minds, the strength developed would serve them later. Any specific information that they might miss learning at school would be available through libraries and other community resources if they need it and are familiar with the process of searching out and assimilating it.

Psychic Development

There is some controversy about the term "psyche". Some consider it to mean that which is beyond the spheres of the sciences, and therefore believe it to be superstition. Other people understand the psyche to be the part of one's self that is sensitive to thoughts, feelings, and other phenomena which are not measurable in the ordinary way.

In a way, the psyche is an extension of the intellect (or vice-versa). When people observe situations, there are things which they perceive consciously and there are others of which they are unaware. If someone throws a ball to you, for example, you see it coming and reach for where you expect it to be when it gets to you. Few people could consciously figure the speed and trajectory of a thrown ball and determine with that information where it will end up, but it is not uncommon to catch a ball directly at that point. This subtle perception and calculation is a process that goes on continually in addition to our conscious activity.

When we observe something, we are normally conscious only of that portion of the scene that our attention is focussed on at any moment. However, our senses register all that is within their range. Evidence of this detailed perception has come from people who, under hypnosis, can recall many details about a scene in which they had been totally preoccupied by a particular incident. The details recalled would have received no attention under the circumstances but, nevertheless, they had been observed. Since the part of the mind involved in this kind of perception has vastly greater amounts of information to work with than does the intellect, its conclusions, known as intuitions, are often beneficial guides for our conscious activities.

We can develop our psychic abilities by concentrating intensely on everything that goes on in and around ourselves. The fundamental obstacle is the conscious chatter which abounds in our minds as we comment to ourselves about what we are perceiving and as our minds wander. When this conscious chatter is cleared out of the way and we perceive quietly with all our senses, it is possible to come closer to the subtle part of our minds. The strength of perception brought about by this exercise helps individuals understand themselves better, become more sensitive to the people and natural phenomena that they come in contact with, and it improves their ability to concentrate.

With much refinement, and perhaps a little natural aptitude, this sensitization is reputed to lead to the perception of auras, mental telepathy, precognition, psychokinesis, faith healing and a variety of other abilities. These capabilities are still largely poo-pooed in the west but have received more attention since the publication of the book *Psychic Discoveries Behind the Iron Curtain* revealed that Russia and her allies do take these matters seriously and have conducted considerable research to develop their understanding of them.

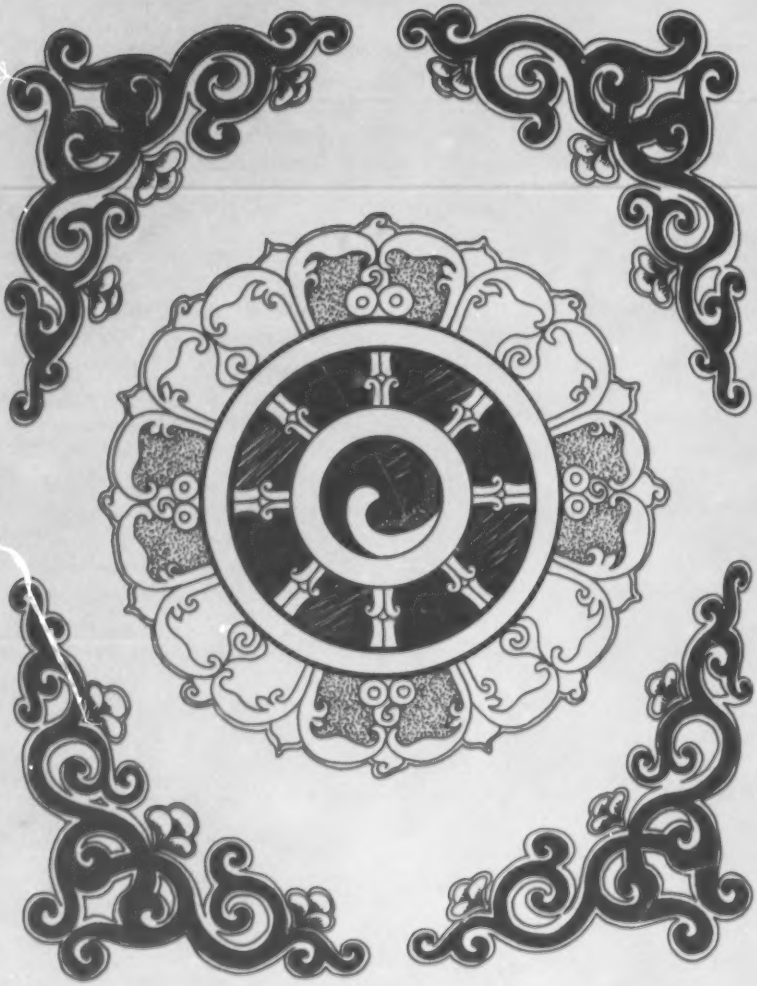
Spiritual Development

Spiritual development is similar to intellectual and psychic development in that it involves work within the self. In a way, spirit can be seen as the step following the progression from intellect to psyche.

You can locate the spirit in you if you sit quietly and identify all the things which may be yours but are not you. To start with, there are all the material possessions. Forget them for now. Next notice your feet, legs, hands, arms, head and torso. Feel your lungs breathing in and out, your heart pumping and your blood flowing to all the parts of your body. The entire body is yours to direct, but it is not you. Notice your senses then ignore them so there is no smell, no sound, no sight, no taste and no sense of touch. You are alone with your thoughts which are nothing more than combinations of past perceptions. Drop them, and also let go of their subtle counterpart, feelings.

What is left is your essence, that to which all of the other things belong, the spirit of your being. This quality of existence is shared by everyone and everything. We differ in the characteristics and other things that we possess, but in essence, all is the same.

Spiritual development is a process of becoming attuned to this quality of being and to the unity of all things through it. There are many schools of practise to follow. Some have passed their practises down for so many generations that they put more emphasis on the ritual and symbolism than on the spirit and the point is missed by many of those going through the rituals. However, most practises in one way or another share the discipline of making a personal effort to experience the essence of being. Through continued practise the individuals involved can become familiar with their essence and can see the unity of themselves with the universe.



When this familiarity is attained it makes no difference if one works for his or her self or for others; every positive action betters the whole. What is done with one's ability to work then becomes a decision of where that labour can be applied to do the most good.

Many people doing spiritual practises are not prepared to become devoted to this pursuit. Rather, their interest is to use the development of this part of themselves to overcome their worries and disorganization. Exercising spiritual perception for these ends can produce the desired result and is likely to incline the individuals involved toward lives which are in greater harmony with others and their surroundings.

Interpersonal Relations

The last item on this list of possibilities of how people can fill their lives without being a drain on the systems that support them is probably the most enriching of all. There are many people who value nothing more than loving, being loved and friendship.

There are many ways in which relating with other people can be uplifting; from love's ecstasy, through simple conversation and involved discussions, to the playing of games. Passing time with friends can be pleasant, informative and even hilarious, depending on the people and the moods that they are in. Even if one is feeling upset it is much less distressing to be upset when there are friends around than when one is alone.

Having other people around helps work go easier, as well. A big task which would be drudgery for a single person can turn into a party when the labour is shared and people can talk with each other. Barn raising and quilting bees are traditional examples. Even when the length of time worked remains the same, the labour is more enjoyable when spent in a collective endeavour.

People can help each other in solving problems, as well. During brainstorming, two or more people get together and express their ideas on a given topic. What one person thinks often triggers ideas in another. When the new idea is brought out it provides further stimulus for more ideas. In this way a much wider range of possibilities is explored than is likely to be covered by the people individually. Consequently, a group will often come up with a better solution to a problem than would the individual people.

There are also ways in which one person can help another resolve emotional problems. By providing attention and letting a person who is upset explain their problem, it is often possible for the upset person to see his or her trouble in a way that is difficult to do alone. Sometimes just having someone interested and willing to listen is sufficient to make a person feel better.

It is also evident that people who have others close to them are less likely to be disturbed in the first place. Harvey Jenkins, the originator of revaluation co-counselling, made the observation that no individual could expect to function to their full capacity without four warm tender hugs a day. Some people rebel at the thought of quantifying tenderness. The number of hugs is not the point of the observation; what is significant is that our moods can be substantially uplifted by being close to other people. Of particular consequence to the task outlined by this book is that, if we can become accustomed to using our ability to reinforce and revitalize each other, we can become strong enough to resist the powers that take advantage of us.

The possibilities outlined above and many others with which we can better each other's lives require nothing more than that we care to be with each other.

The life-based pursuits described here have been differentiated for the purpose of identification; in fact the different activities overlap in many areas. It has been the purpose of this chapter to clarify directions in which we can gain personal satisfaction in our lives without threatening the processes which make it possible for us to live, and without requiring that we compete for the limited material resources of our planet.

With the wealth of human potentials that are open to us, one might wonder why consumptive pursuits are so popular in our culture. The answer may be that the alternatives of developing ourselves are seldom presented to people wondering what to do with their lives. On the other hand, there are lots of messages around saying that we can be satisfied by buying this or that. Once people become aware of the possibilities within themselves they can develop to whatever extent they are willing to put in time and effort. With the exception of some remuneration for introducing people to how to develop in some area, there is no money to be made from life-based pursuits. Consequently, there is no money for advertising and the range of possibilities offered to people is one-sided.

Fortunately, there are more and more people who have become disillusioned with the 'consumptive' way of life and have discovered that the satisfaction they get from developing themselves is more tangible and more durable. The example that these people make serves as notice that there are other ways to be.

Appropriate Technology

After observing the human situation from the perspective of this book, it is natural to think about ways of supporting our lives that do not transgress nature's restrictions.

Over millennia, human ingenuity has devised a multitude of techniques to provide for the needs of people. Many of these techniques are bakavi. The operating principles described below are environmentally appropriate and on a small to intermediate scale. Large-scale technologies are those which involve tens of thousands of people and massive networks of material supplies and transportation. It is almost inevitable that such technologies will overstep the bakavi guidelines to the extent that it is dangerous to be dependent on them. Because of the complexity of large-scale systems it is unusual for the people relying on them to understand how they work. This situation leads to helplessness in the event that something goes wrong. Furthermore, although these complex systems can be a major factor in our lives, it is a struggle for us to have any say in their operation. Small-scale technology, on the other hand, is entirely manageable by an individual or a few people. The scope of things which can be handled on the small scale, however, is quite limited. These considerations suggest that we look toward intermediate scale technologies which come between the two extremes.

The value of large-scale systems, however, should not be ignored. There are many small and intermediate scale technologies which have evolved from large-scale technologies. Electronic communication is one: having come through the vacuum tube stage with its multitude of machined parts, it has progressed to the integrated circuit which has basically one or two parts made from the very common element, silicon. Not only is the new technology able to provide more service using less material; it can also be maintained by fewer people with less machinery. This example illustrates that intermediate scale technology does not necessarily involve going back to the 1850's, but instead constitutes a more

sophisticated state wherein balance between the psychological, ecological and physical aspects of human culture can be maintained.

We have at this time the greatest potential that humanity has ever enjoyed for adapting the earth's resources to our service and for distributing them around the world. National and multinational corporations are marvelous feats of organization. If their research and production capabilities were sincerely directed toward the long-term well-being of humanity, we would be well on the way to meeting the demands of the present period of history. The catch is that these corporations would only be a means to an end. With the establishment of enough bakavi systems to support the human family, our need for mega-organizations would be greatly reduced, with the exception of a network to facilitate international communication, understanding and cooperation. This would present no problem if the people behind the multinationals could be content to know that there would be wholesome supplies of food, shelter and other necessities for themselves, their children and generations after them. The problems arise from hanging on to habitual patterns even when these patterns lead to undesirable ends.

The material that follows is a survey of some of the technologies that are appropriate to a bakavi way of living. The list is by no means exhaustive; its purpose is to provide food for thought. If you find some of these items interesting there are references listed in the bibliography as well as an expanding selection of other literature containing specific information.

Food

In our western culture when we hear the word "technology", energy and machinery come quickly to mind. Unfortunately, the knowledge of techniques in agriculture are less often thought of. Although energy and machinery have their place, we are primarily dependent for our health and even our lives on successful agriculture.

A key link in the agriculture-nutrition-waste cycle is the compost pile. Basically, a compost pile is made by accumulating left-over parts of plants, barnyard manure and other substances from living sources such as kitchen scraps, wood chips, cut hair, dead leaves and so on. While piling these

materials together, small amounts of soil or old compost should be added to introduce bacteria for decomposing. All the material should be dampened. The pile needs to be large enough that the heat produced by the decomposers can build up inside and small enough for oxygen to penetrate to support the process. A pile six feet high by six feet wide when first constructed, and as long as necessary, will provide good results. (Any amount of organic matter will eventually break down and be usable as fertilizer, but the larger piles do so more quickly and sterilize themselves in the process). After the bacteria have had a chance to multiply and start consuming the organic matter, the temperature in the pile rises enough to kill harmful organisms. When the compost has been sitting for a while, it needs to be turned. Care should be taken when turning the pile to get the outside of the old pile into the centre of the new pile where it will get heated. This is particularly important when human feces are a part of the compost.

There are composting toilets on the market or which can be built that provide a continuous composting process. Basically, they consist of a toilet and a large storage tank where the fecal matter accumulates and decomposes. The washroom can resemble conventional washrooms, and venting on the tank can prevent any problem with odors. At the other end of the process, after a year or so, the fecal matter is completely broken down and the harmful bacteria have either been killed by the heat, or have lived out their lives. The finished compost can then be removed from time to time, as it accumulates, and used to fertilize growing things.

After several months or, if compost materials are shredded and turned often, a couple of weeks, an outdoor compost pile will be considerably reduced in size and will consist of a fine, crumbly dark humus which is an excellent fertilizer. Not only are the nutrients bound with carbon so that they are slowly released and made available to growing plants, but the organic matter makes the soil porous so that water is absorbed better and gases can circulate to plant roots.

If the soil being worked is deficient in some of the nutrients needed for healthy growth, it is possible to introduce those substances either by composting plants which accumulate them or by adding crushed rocks containing the necessary

elements. In either case, once the nutrient balance is established in the soil, if the crops taken from it are composted and returned after use, food need not be a problem as long as the sun shines.

Another way of rendering organic material into fertilizer is through the use of a methane digester. Basically, a methane digester is an air-tight container into which are put the same sorts of materials that would be composted, but with more water. In a sealed container the supply of oxygen is soon exhausted and bacteria that live in the absence of oxygen (anaerobic bacteria) take over. Anaerobic bacteria do best at a temperature above 21°C and below 38°C. Under such conditions they break down the organic matter into nutrient components suitable for plant growth, and produce methane gas as a by-product. The methane can be collected by bubbling it into a gas trap as shown in the illustration. From there it can be compressed carefully and stored, or used directly for anything that natural gas can be used for.

One technique that considerably reduces the upkeep that a garden requires is mulching. Mulch is a layer of material covering the soil between plants. Straw, spoiled hay or old leaves are among the best materials; sawdust, newspaper and stones will serve most or some of the same purposes. Mulching has several benefits. The most noticeable one is keeping down weeds. Sometimes in a mulched garden it is only necessary to weed around the stems of vegetables when they are young before they shade out competitors. When weeds do penetrate the mulch they can be controlled by putting more mulch on top of them, or by lifting the mulch with a hay fork and lowering it on top of the weeds. In addition, by covering the soil direct sunlight cannot penetrate to dry and bake it. Even in moderate dry spells the soil directly under the mulch will remain moist. The mulch also protects the soil from being compacted by heavy rain and, like a sponge, holds the rain-water so that it can be slowly absorbed rather than running off over the surface. Furthermore, as the season progresses, the mulch in contact with the ground decomposes, thereby adding nutrients to the soil.

Damage from insects and diseases are a major agricultural problem. The best defense against such damage is to have healthy plants. As with humans, healthy individuals are more resistant than weaker ones. It was mentioned earlier that the health of a plant depends on it having a balance of trace elements to provide for all its needs; proper maintenance of the soil to assure abundantly available nutrients will effectively reduce parasitic damage, as well.

Growing a variety of plants in a number of small plots also cuts down on losses. There are some plants which many insects don't like: garlic and marigolds, for instance. If these are planted around susceptible crops, they tend to keep the insects away. If a pest does come around a small plot, it doesn't have the opportunity for the explosive growth that it would have in a large area planted with its favourite food. It is possible that an insect or disease problem could be confined to one patch of a certain crop and that other patches would remain unharmed. At worst, with a diversified agriculture, even if all the plots of a certain plant were attacked, there would still be other crops to live on.

Over the years there have been many species of plants developed through selective breeding which are resistant to

pests and diseases. The use and continued development of such plants is obviously to our advantage.

When pests start causing damage to crops there are appropriate means of controlling them. Most of the insects which attack crops have natural enemies. By setting up the type of habitat that these predators like, they can be encouraged to live near a garden. If they like the home provided for them, they will eat the undesirable insects in the garden. These natural predators can often be obtained for this purpose from nearby fields or by ordering them from biological control centres.

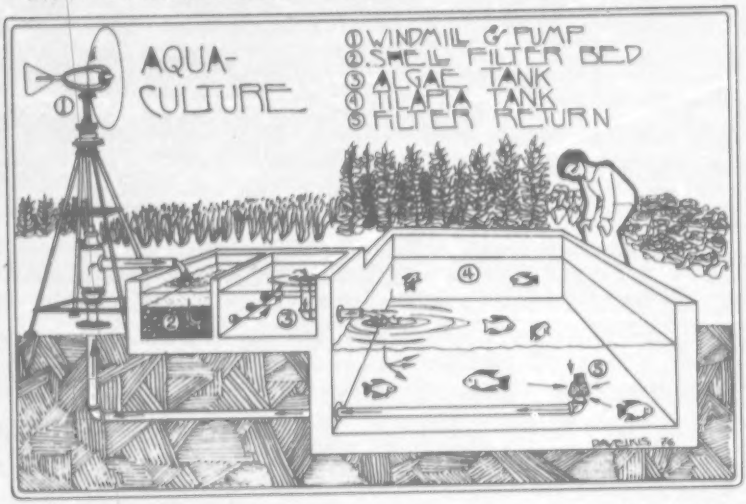
Other lines of defence are traps and barriers. There are substances which will attract and kill various insects. Stale beer, for instance, will attract and drown slugs. Molasses, vinegar and citrus fruit among others have been found to attract grasshoppers. On another level, crawling insects can be stopped by circling the garden with wood ashes or in some cases by digging a shallow trench.

If all else fails, it is possible to make sprays or dusts for controlling insects and diseases from substances which will not disrupt the environment. Tobacco leaves, garlic and hot peppers are some of the more common things that can be used. Rotenone and pyrethrum are stronger substances which also come from plant sources.

Rather than clobbering intruders with the strongest remedy one feels justified in using, it is more desirable and less disruptive to pay attention to the particular organism that is causing the problem and to deal with it specifically. There is a great deal of information available on this topic. The short section written here is only to introduce some possibilities. The reference book *Organic Plant Protection* is annotated in the bibliography.

The New Alchemy Institute has provided an excellent example of how people can live by managing living systems. They have set up pools for raising a plant-eating fish called tilapia. The water from the fish pond is pumped by windmills to a filter consisting of pieces of oyster shells averaging one and a half inches in diameter. These shells provide a surface for bacteria to live on. The bacteria break down the toxic fish wastes into basic nutrients which then spill into an algae tank. When the water splashes into the tank it absorbs oxygen which further purifies it. The algae grow on the

nutrients from the filter and are then fed to the fish which in turn are available to people for food. Since the removal of the fish depletes the nutrient inventory of the system, it is necessary to supplement the fishes' food with other plant material grown outside the system. These supplements, however, can be provided from the larger human-compost-soil-plant cycle, and the sun keeps it all going. Details of this system and variations of it are available from the *Journal of the New Alchemists* also listed in the bibliography.



The knowledge of how to grow food is sufficiently abundant that it is possible for most people to feed themselves if they have access to land and are willing to work. The occurrence of winters and dry seasons in many parts of the world requires that people know how to store enough food to feed themselves until the growing season returns. Bottled preserves, drying, storage in cool cellars and freezing are appropriate methods that have long served this purpose. Once a healthy diet is provided for people can then properly undertake other tasks necessary to survival.

Temperature Control

The control of temperature is of great significance to human settlements. The temperatures that we utilize range from the intense heat used for working with metals, ceramics

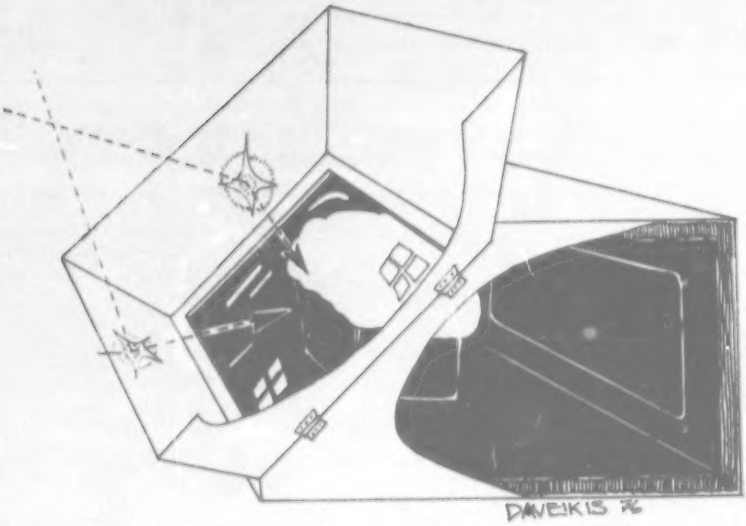
and glass, down through the temperatures needed for cooking and heating our dwellings, to cooling living spaces, refrigeration and deep freeze. With careful management, the range of temperature in the environment can be used to serve our specific needs.

The sun is the source of almost all of the energy present on this plane.. We can intercept solar energy by using photo-voltaic cells, solar reflectors, solar collectors and plants. The first of these is the same device that makes a photographer's light meter work. Banks of photo-voltaic cells provide power for satellites by directly converting the sunlight that falls on them into electricity. However, practical application as a supplier of larger quantities of power seems far off since their manufacture is complicated and large numbers of them are expensive.

Solar reflectors are relatively simple. When you are standing in the sunshine you can feel radiant heat. If a mirror is positioned nearby to reflect additional sunlight in your direction, the heat experienced will increase. A parabolic reflector is mirror-shaped so that all the light that shines on it is reflected toward one spot. A reflector of this type can replace an electric element or wood fire for cooking on sunny days. The greater the area from which the sunlight is reflected, the greater the temperature at the focus point. There is one solar reflector built onto a building in France that reaches a temperature higher than that necessary to melt iron.

The other major device for using sun energy directly is the solar collector. Solar collectors have the advantage of being able to use the energy from random light, whereas solar reflectors need direct sunlight. A solar collector uses the property of glass or plastic which allows light energy to pass through but reflects heat energy. The collector consists of an enclosed, insulated space with a clear glass or plastic front and a dark interior. The light passes into the collector and is absorbed by the dark surface which in turn gets hot and radiates heat. However, because of the longer wavelength of heat radiation, it cannot pass out of the collector, and as more light enters heat accumulates. The heat accumulated in this way can be used where it is, as in a greenhouse, or air or liquids can be circulated through the collector to absorb the heat and carry it to where it is needed. Hot water and space heating can be largely taken care of in this way.

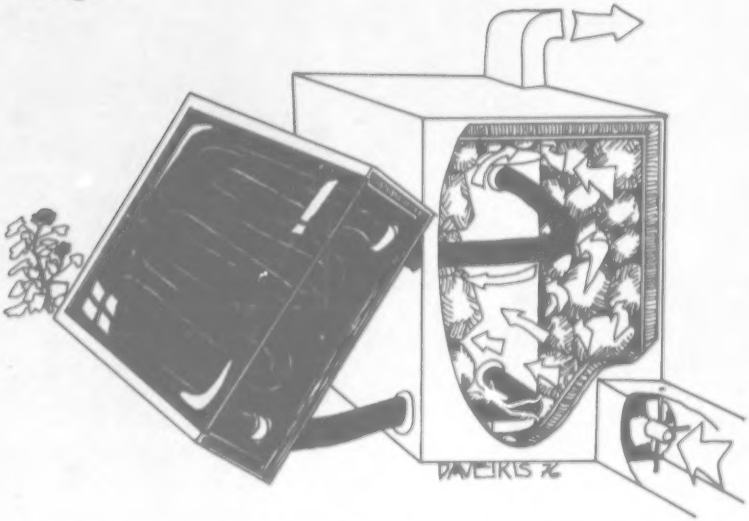
A simple device that uses both the collector and reflector principles is the solar oven. The oven can be made by taking a metal box or small barrel that is open on one side or end. All the solid sides should be well insulated and coated on the inside with matte black. Stove polish is excellent for this coating because of its resistance to heat. When a piece of glass is fitted over the open side, the device will collect solar energy. To increase the heat captured for baking, reflecting surfaces can be arranged around the opening to direct more energy into the oven. Depending on the use to be made of it, a solar oven can be of any size, provided the reflecting surface is increased proportionally. Models having a reflecting surface four times larger than the glass front have been reported to work well.



It is unfortunate that the times when heat is most needed are often the times when there is the least sunlight. This makes techniques for storing heat necessary. Anyone who has ever noticed heat radiating from exposed rocks after the sun has set, or the moderation of temperatures caused by large bodies of water, might have concluded that a quantity of warm rocks or water inside a dwelling would keep it warm. Indeed, both of these methods have been tried and found effective.

One possible arrangement for using this principle follows: Within a sealed space through which air flow can be regulated is a large tank of water surrounded by rocks piled with air spaces between them. A pipe runs from the bottom of the tank to the bottom of a solar collector, crosses back and forth to the top of the collector and back to the top of the water tank. The pipes in the collector should be black to absorb heat and the connections between the water tank and the collector should be insulated. When the water in the pipes in the solar collector gets hot it will rise by convection and be replaced with the coolest water from the bottom of the tank. In this way the water in the tank heats up as long as the collector is working. All the while the tank is warming the surrounding stones. When heat is needed in the dwelling, air can be blown through the stones, warmed up and returned to the

living space. It is desirable to insulate the collector at night so that it doesn't lose heat in the reverse process to its daytime operation. In very cold climates, to prevent freezing, it may be necessary to put antifreeze in the water or even to drain the system during the long nights. This system could be varied by using hot water and radiators in the house or by circulating air to transfer heat from the collector to the rock storage.



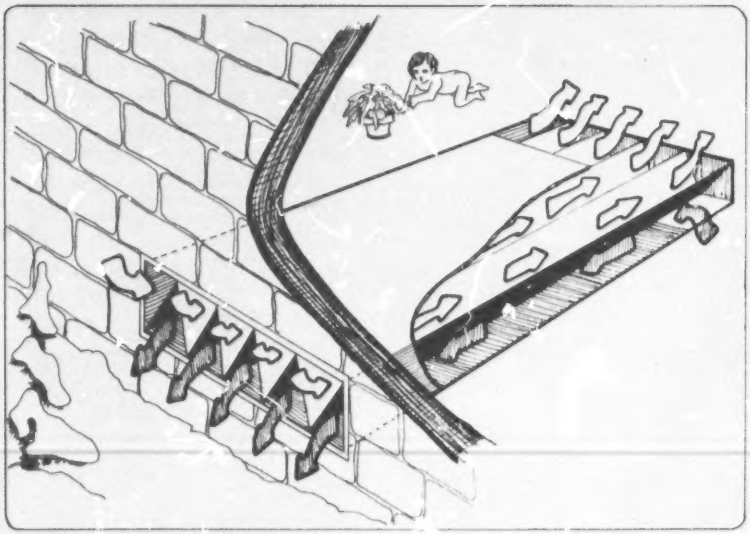
More heat can be stored in an equivalent amount of space by using a medium which changes from a liquid to a solid at an appropriate temperature. The amount of heat that has to be lost for a substance to drop the degree in temperature between its liquid and its solid state (also from gas to liquid) is many times greater than for any other similar drop in temperature. Therefore, effective heat storage can be provided by a wax or a solution containing eutectic salts, which undergo their phase change around the temperature desirable for heating air. When cool air from the house is passed around the storage facilities, it takes on heat. As the storage medium cools, some of the salt or wax solidifies giving off the extra energy that kept it liquid. The desirability of this sort of storage is a balance between the smaller space requirements and the more expensive and scarce materials.

Occasionally in southern climates, and more often in northern ones, there will be cloudy periods of cold that last longer than the stored heat. In these circumstances there would have to be other reserves of energy for use. Again we can look to green plants which follow the sun all summer long, capturing its energy and building the energy into their bodies. A wood lot will provide a perpetual supply of firewood if the harvest does not exceed annual growth. Waste plant materials or crops grown for the purpose could be fed into a methane digester to provide methane gas, or the same types of materials could be fermented and distilled to produce alcohol which can also be burned. (In this latter case there are still some legal problems to overcome).

Wood, methane, alcohol and power from windmills when the wind is blowing, can all serve to back up the solar heating systems described earlier. These sources of energy are capable of producing very high temperatures. With good planning, double use can be made of them. Cold spells would be the obvious times to do such work as ceramics and metal working. The facilities for these industries could be set up in such a way that the heat escaping from them could recharge the heat storage system. The same double use of heat could be practiced to a lesser extent with everyday cooking facilities.

The insulation that surrounds all the interior living space keeps in any heat that can be harnessed and brought into the building.

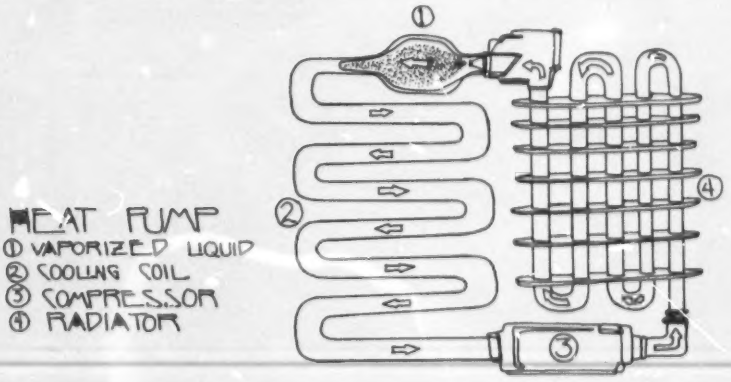
When it is cold outside, however, it is often the case that warmth escapes for want of fresh air. This loss can be reduced by bringing fresh air in through a heat exchanger. A heat exchanger consists of a long duct with a folded divider in it that provides a large surface area over which cold fresh air and warm stale air can pass, separated only by a thin sheet of metal. As they pass, the warm air loses its heat to the cold air. The first impression is that about half of the heat would be retained in this manner. Actually, about 80% of the heat is saved since, by the time the outflowing air nears the outside end of the exchanger, the air it passes is at its coldest and readily takes up whatever warmth is still in the air from inside.



The preceeding has described a few of the ways to keep warm in winter that can be sustained by a community within the bakavi framework. In summer, it is desirable to have the living space cooler than it is outside. In a large building it would be possible to have the heat storage facilities divided into a number of sections. As the days grow longer some of the sections could be opened up to the colder nights, and when cooling is desired these sections could be used in the reverse of their winter function.

The same principle can be applied to freezing, for food storage. A special, well-insulated storage mass around a freezer space could be exposed to the coldest winter nights and then closed off as the warmer weather comes. It would be important that the entrance to the freezer be protected by at least two doors so that the door to the warm space can be be closed before the door to the cold space is opened. With this precaution against heat loss when the freezer is used, and sufficient frozen mass, the freezer could stay frozen for a large part of the year. Any additional cooling needed could be provided by a heat pump powered when the wind blows.

A heat pump is a wonderful device. It is the working component of a refrigerator. A heat pump works because when a liquid becomes a gas, or a gas under pressure expands, it absorbs heat. This is why the spray from aerosols is always cold. In a refrigerator there is a gas, usually freon, which is allowed to expand into the cooling coils in the freezer where it absorbs heat. After the freon passes out of the freezer it is compressed again. When the molecules are forced closer together they collide, releasing heat which is radiated away from the outside of the fridge. The compressed gas is then again allowed to expand into the cooling coils to pick up more heat. The same system can be used to pump heat out of the ground or from moving water to inside living spaces. It is not unusual for a heat pump to provide four times as much energy in the form of heat than is necessary to run it.



Mechanical Energy

Windmills have been used by people for hundreds of years. Over the time, many designs have been developed, from cloth sails on wooden frames to aerodynamic aluminum air foils. Whatever the design, the idea is to get the wind to push on one side of a number of blades and thereby set a shaft into circular motion. Waterwheels or turbines work on basically the same principle except that they are intercepting a flow of water. In both these cases, the rotating shaft can power mechanical devices, pump water, mix bread, do laundry, run refrigerators and machine tools, cut wood, blow

air through heating and cooling systems and do practically anything else that requires mechanical energy.

Numerous tools have been devised to help with the many jobs of preparing our food, making our clothing, furniture, utensils and other items that we use in our daily lives. Many of these tools are appropriate the way they exist today and need only be powered by the wind, moving water or even human energy to be suitable to a bakavi way of living.

To a large extent, the connections between power source and tools can be made with belts, pulleys and turning shafts. I visited a mill once which, during the nineteen thirties, took freshly cut sheep's fleece in one end and put wool blankets out the other. The carders, spinners and looms were predominantly made of wood and could be maintained by the miller. The old man who showed us around told of how he used to maintain his own wooden bearings. As the old bearings wore down, wedges were driven under them to keep them tight, and when the piece was worn out, a block of hardwood worked on the lathe would soon produce a new one. This particular mill was run from a stream. It was amazing to hear water splashing through the turbine as the dam gate was opened and to see the machinery inside the mill start to turn. There was one place where a pulley on a long arm was turning on a belt as the belt ran up through the floor from the main power shaft below. The pulley on the long arm held the belt taut; when the miller had us help him lift the pulley off of the belt, the belt started to slip and an entire side of the shop rolled to a halt.

Transferring energy from a windmill or watermill to tools can also be accomplished by generating electricity directly from the rotating shaft and then transferring it over wires to motors that run the tools. Before building such a system we must consider whether or not the generators, motors and wires use more than our share of copper, and whether or not the tools and skills for maintaining the electrical equipment are within our abilities to control.

The energy from moving water is generally reliable, the rate of water flow in most cases only fluctuates with the seasons. The wind on the other hand, can vary greatly from day to day, or even within a day. When it is blowing, a great amount of energy is available; at other times there is none.

For many things this doesn't matter. In a community living sensitively with its surroundings, many of the jobs that require mechanical energy can wait until the wind comes up. When it does come up, its presence will help determine what the activity of the day will be. If mechanical work must be done when there has been no wind for a period of time, stored energy from wood could run a steam engine, or the labour of people or animals could be employed.

There are, however, ways of storing energy from windmills. One of the most direct would be to use the wind energy to accelerate a large flywheel. In addition to evening out the irregularities on a windy day, a flywheel could hold mechanical energy for use long after the wind has died down. The amount of energy which a flywheel can store is determined more by its strength than by its weight. If the weight doubles, twice as much energy can be stored. On the other hand, if it is strong enough to go twice as fast, it can hold eight times as much energy. Buses have been built which run on a flywheel system for many miles full of passengers. They draw on the stored energy of the flywheel to accelerate, and when they slow down they do so by using the forward momentum to speed up the flywheel.

Extra mechanical energy can be stored by using it to pump water into a high reservoir. When energy is needed it can be reclaimed by running the water down the hill again through a turbine.

Another way of storing energy is to pass electric current from a wind generator or other source through water with a little bit of sulphuric acid in it. As the current enters the solution, some of the water is broken down into hydrogen and oxygen, which can then be stored. Burning the hydrogen at a later time can make the energy available again as heat. Because of the explosive potential of the hydrogen, however, it must be handled with caution.

Besides the means mentioned above for getting the sun, the wind or moving water to do work for us, there is always the strength of our bodies which we can direct wilfully. In addition to the many obvious ways in which we can help ourselves, tools have and can be built with which we can do a large number of jobs. Like the old wine press that had a

twelve-foot wheel with rungs on it that could be pulled down one after another; the device could concentrate enough pressure through mechanical advantage so that one person could squeeze the juice out of fruit. The same mechanism could squeeze oil out of seeds and do other tasks which require extreme pressures. By using the pedal-drive principle of a bicycle a contraption could be set up which could power a vacuum cleaner, move air through heating systems or run various appliances as desired. Although physical exertion is often avoided in our culture, it has its positive aspects. The foods we eat contain vitamins and minerals in addition to the carbohydrates that we metabolize for energy. When we get lots of exercise our appetites are increased, the carbohydrates we have eaten are used up, and our bodies are left with greater quantities of vitamins and minerals for the maintenance of our health. Sound sleep is also a likely reward when a person's day includes some physical labour.

The possibilities mentioned in the last several pages only introduce some of the appropriate technologies that are available to us. Much has been left out. Much is yet to be devised. For people with ingenuity there is a wide range of possibilities to which they can apply their skills. Inventors have always had to work with the physical laws that govern the materials that they use. Now that the consequences of not designing with the laws of nature are known, we can add these restrictions to the design criteria. If we apply ourselves to finding a bakavi way of living, we will no doubt come to know many interesting new ways of dealing with the world.

Two Wishes of the Heart

On a certain day at an uncertain time a certain man was granted two wishes of his heart. 'In the name of God,' he said, 'I wish to look upon the face of heaven, and then of hell.'

At once an enormous jinn, dispatched expressly to grant his wishes, bore him up into the air above an expanse of mountains and whirled him at last to the edge of a desert, above which they hovered in a flurry of light. 'Look before you and see the face of heaven,' said the jinn, 'and praise be God for the sight of it.' Before the eyes of the man shimmered an endless table laden with endless foods and wines, and a soft music came to him through the air that made him weep. 'Now show me the very heart of hell'. 'I hear and obey,' said the jinn. The man was astonished to be presented with precisely the same scene. 'I observe your astonishment,' said the jinn, 'and feel compelled to remind you that you asked only for a glimpse of a certain two locations. If you would like in addition to see their respective inhabitants, let us say between us that it can be arranged for a price.'

'Show me,' said the man, and before his weary eyes and through the veil of his incomprehension he saw men filing into each mirage, each with a spoon one meter long chained to his wrist. The people in hell struggled and cursed, but try as they might they could not get one morsel of food into their mouths. But the people in heaven sat and smiled, and proceeded to spoon food to those sitting opposite them.

from Beshara

Community

When was the last time that you went for more than a day without interacting with another human being? It is an unusual circumstance for most people and there are many who have never experienced such isolation.

The influence of other people on our lives, however, is far more pervasive than our person-to-person encounters. Suppose you are camping alone in the woods. The tent you are using was made by someone else, or if you made the tent, the cloth you used was from another's labours. It may be that you wanted to demonstrate to yourself your own independence so you grew the fibres, spun the thread and wove the cloth from which to make the tent. It would be an admirable attempt but still you would have our ancestors to thank for passing down the knowledge of spinning and weaving. Even the thoughts that run through our heads are for the most part composed of words and ideas which we have inherited.

It would be hard to know if homo sapiens ever existed other than as social beings. In any case, we have lived interdependently for so long that it would be extremely difficult to imagine life outside a social context. In a few cases young people have been discovered who had been raised from infancy by animals and who had had no contact with society. There was no doubt that these individuals were human but they had no concept of language and none of the background of experiences that we learn as we grow and that we use to relate with the people and things of our society. If there were several such uncultured people living without interference in an area, perhaps their large brains and dexterity would lead them to discover things and ways to communicate them. In such circumstances, however, it would be thousands of generations before they could accumulate the comprehension and techniques that are the background of almost every adult in our society today.

Community is sometimes identified by the fact that a person's life can be lived fully within it. This means that for a community to fulfil its function it must not only supply its members with the food and shelter that they need, but also with opportunities for learning, love, usefulness, belonging, creativity and appreciation to provide for their happiness. The boundaries which define our communities are not always rigid. Different needs are relevent to different sized groupings of people. Some activities reach no further than family or close friends. Other involvements would concern all the people in an association or a neighbourhood; still other matters are of consequence to counties, countries or the world.

For most of human history the needs of people have been met largely by the interaction of people in communities of village size. Recently, in our industrial society, the trend has been for our physical necessities to be provided by systems of increasing size. There are hundreds of thousands of people involved in the multitude of steps that produce the goods and services which most North Americans have grown accustomed to consuming. The orientation of our communities to produce on this massive, complex scale has left society lacking in some of its other functions.

There are several ways in which it would be beneficial for our communities to be on a scale that we can understand.

If people were aware of the processes that support their communities, they would be more sensitive to the impact that their methods of production and waste disposal have on the environment that supports them. Consequently, destructive tendencies could be recognized early and changed before the damage became serious. Also, in smaller communities the transportation needs and organizational problems of getting used materials ready for recycling would be much less.

In the sort of community where most of the goods needed by the inhabitants are locally produced, children would grow up seeing how their society makes its living. Merely by encouraging their curiousity this situation would provide an elementary education which would include most of what the coming generation would need to know to maintain itself later on. Children would not be the only ones to benefit from such a visible society. Adults gain security and dignity when they see that their labour, along with that of

their neighbours, is sufficient to provide for their basic needs.

People feel good when they know that their efforts are of direct benefit to others. Almost everyone has experienced making or doing something for someone they know. There is a tendency for people working directly for people they know to do their best and for the work to be done more in excitement than in drudgery. As a result of putting care into their work, people are inclined to feel better about themselves. Also, when people see that things are being done for them with care, they know that there is concern for their well-being.

There is another benefit when the people in a community are familiar with the different labours that have to be done in order to maintain the life of the community; unemployment, as a negative state, ceases to exist. If people complete the jobs they are working on they can help with other work or if there is little that needs to be done, they can entertain themselves and each other until their labour is again needed. There is a paradox in the situation in which people run the risk of having no livelihood if they complete the job they are working at. Such a threat encourages people to degrade their job to the point that instead of trying to complete what is before them, they are trying to stretch out the work.

One more advantage of smaller communities is that individuals have a greater opportunity to be involved in making the decisions that affect them. The more that people feel they have a part in making a decision, the greater the responsibility they will feel for working with that decision.

The thesis of this book is that Bakavi principles need to be applied to our civilization. Bakavi values can be applied to any living situation which people find themselves in. The education and organization needed for a city to be aware of and responsive to its life process are greater than for a smaller community but they are not inconceivable. It is also possible for people to form mutually supporting communities within a city. What is suggested here is that closer communities provide greater opportunities for people to feel better about themselves. If we are feeling good we are more likely to take an active role in solving problems, rather than trying to evade them.

A major difference between attitudes of people from communities too large to care and ones where people do care for each other is in their assessment of personal accomplishment. When people are alone in society they are likely to measure their value in terms of their material acquisitions. In a closer community, however, the measure of personal worth is more likely to be, "How much service have I provided for others?"

Over the past several thousand years there have been many philosophies adopted to guide people through the circumstances of their times. One theme that appears again and again is that of the Golden Rule. In the Christian tradition Jesus expressed it when he said: "whatever you wish that men would do to you, do so to them." It can also be found in the Buddhist writing Vdana-Varga: "Hurt no others with that which pains yourself." And Confucius: "Never do to others that you would not like them to do to you." Islam: "No one of you is a believer until he loves for his brother what he loves for himself." And the Talmud: "What is hurtful to yourself do not to your fellow man." Almost any other code of ethics will state the same principle somewhere within it.

In practice, if people treat each other as they would like to be treated themselves, the possibilities for those people to co-habit peacefully is greatly enhanced. Peaceful co-habitation in turn will make people more effective in dealing collectively with any adverse circumstance.

Societies adhering to this ideal probably have a greater survival rate, and through natural selection the characteristic may well have become a background influence in human psychology.

The Law of Feeling, identified by Duncan Blewett in his book *The Frontiers of Being*, is supportive of this idea. The Law of Feeling states that: "When one loves, that is, does selflessly for others, one feels pleasure and self-approval." This can be tested simply by doing a good deed for someone and observing how the act affects the way you feel about yourself and consequently about the world.

To a large extent self-approval is the basis of mental stability and it is generally believed that mental stability is one of the key factors in physical well-being. This is a direct example of how self-interest is served by serving others; it also supports the idea that it is desirable to live in a situation

where one's labours provide directly for the needs of friends and neighbours.

One of the obstacles to creating such communities is the negative connotation that people today associate with work. At one time people would rise in the morning and decide what to do with their time according to what their community needed and what they were able to do. Work was "love made manifest" in the words of Kahlil Gibran. Somewhere along the line, however, working and living ceased to be synonymous. When the industrial revolution took place, work to create things for various needs was replaced by repetitive tasks as part of assembly lines producing for a mass market, or of providing a specialized service to many unfamiliar people. People's relationship to their community was altered from mutual service to a monetary interaction.

Under modern circumstances work has become unpleasant and it is popular to seek opportunities to avoid it. The desire to return work to its former dignity of love given form is expressed in one of the objectives of the North Mountain Community in Virginia:

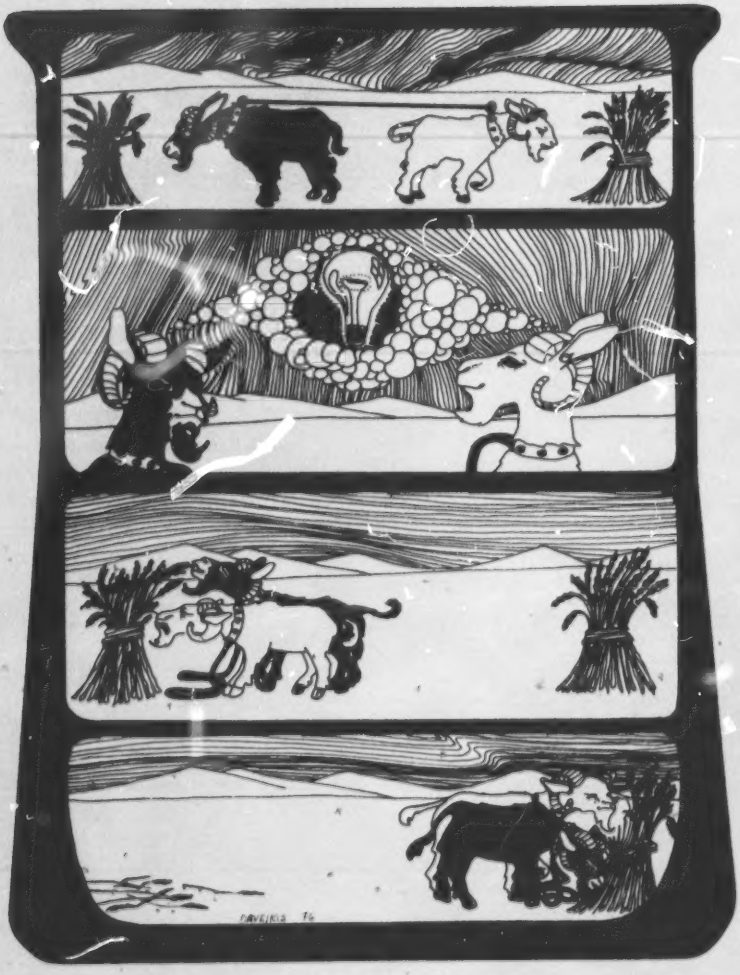
> "We aim to make the quality of our lives such that work no longer holds the connotation of being a debilitating process but rather, is a way of stimulating vitality."

Much has been lost as a result of letting our communities grow beyond the reach of feeling. Much can be gained by bringing them back.

"If only men could see each other as agents of each others' happiness, they could occupy the earth, their common habitation, in peace, and move forward confidently together to their common goal.

The prospect changes when they regard each other as obstacles; soon they have no choice left but to flee or be forever fighting. Humankind then seems nothing but a gigantic error of nature."

Abbé Sieyès
Prelude to the Constitution
1789, France



Epilogue

One day in the winter of 1968-69 I was looking out from an eleventh story window over a residential section of Toronto. It occurred to me at that time that the thousands of people who lived in the houses below had no visible means of support. From the point of view of the individuals in the houses, they worked at their jobs and received money with which to buy the things they needed. However, looking at the community as a whole, all I could see supplying its needs were huge trucks driving in from faraway places.

At the time I was just out of school and unsure of what I was going to do with myself. Just how secure would it be to join the world of the householders outside my window? I wanted to know how the systems worked on which they depended.

The next spring I moved with some friends to a small farm to experience life at its source: the sun, the earth, air, water and seeds. For two years tending a garden, preserving food, composting, doing some construction and gathering firewood filled the summers and falls. The winters, for me, consisted only of time and a pile of books which we had ordered from the Whole Earth Catalogue. I studied what others had written about the macrocosm of society and environment.

After the second winter of reading, it became apparent to me that society faced some serious difficulties. I wanted to help if I could, so later that spring I started travelling around to see what I could learn from people who were already concerned with resolving these difficulties. The object of the search was to find people who were doing things for the sake of people as compared to just earning a living; people who were doing things because they needed to be done and not only because they were getting something in return. Such people can be found in any city and many places in between. Once one of these people is found, he or she usually knows where to find others. There were many along the way who took the time to explain how they saw problems and what they understood about overcoming them. To these people I owe the foundation for this book.

In the fall of 1971 a name was coined around which to continue this study – The Institute for the Study of Cultural Evolution. The name was like a flag. It said: we are interested in the way that civilization changes, has changed and can be changed. Seminars were held and articles and handouts were produced under the flag. It proved to be a not uncommon interest. Ideas were fed back along with suggestions for people to meet and literature to study. By following these leads an education was provided. However, the Institute was only made up of people and had no backing. In the spring of 1974 it was disbanded.

The concern lives on. The experience of that earlier effort has given rise to Bakavi.

One does not have to look far these days to become aware that we are faced with critical problems. Many people, however, don't want to look. This is unfortunate, because these problems can be solved only by people becoming aware of the situation and adapting their lives accordingly. There is a minority of people who have looked and seen what needs to be done and who are willing to exert themselves to make the change. These people are repeating the tradition of the Hopi survivors. Time will judge the relative merit of the two attitudes.

It is necessary that we build another way to support ourselves. If we are to have children, do we not have to provide them with a world that will allow them to grow up? Once we become aware of what is happening we cannot continue as before. It is like standing on railroad tracks and becoming aware that a train is coming; there is no question about staying on or getting off the tracks.

What a relief it would be if society as a whole would wake up to the work we must do. The possibilities would be much greater than for a number of isolated communities. There is so much skill and imagination amongst the people that we could develop a sophisticated and stimulating way to support ourselves within the restrictions of life on earth. How can we overcome the enormous momentum that carries us on as before?

If only everyone could be made aware. Over the last several years concerned people have given me the information which makes up this book. The rest of the people may not want to hear or heed but, before going to work with those who are willing, I feel a responsibility to pass the message along. Figuratively speaking, there is a mountain to climb from which the people can be reached. Bakavi is the message. Climbing the mountain I have met many people who share the concern and who have helped in many ways: this book would have been impossible without their help. As time goes by we will work together where possible, to build our future. There are also many people I have passed who don't want to be bothered. "What can we do, anyway? My apologies for awakening your slumber, but are you sure you want to sleep through this historic challenge? There are also others I have met who like the intensity of the existing way, living only for the moment, and who have no regard for the future. They will not hear and they make the effort to reach them seem futile. Even so, I cannot rest until the obligation has been fulfilled.

This is it. At last a vantage point from which to call out:

CHANGE
THE WORLD
I WANT TO
STAY ON

Bibliography

The quotations and brief descriptions cited here are arranged by topic to compose a picture. Like a mosaic, this bibliography is made up of separate pieces. With each item referring to a book, the picture can be greatly enlarged and detailed by finding the volumes of interest and reading them.

The stars beside some of the selections indicate recommendations from the author of the present volume.

Ecology

**Consider the Process of Living*, William H. Eddy Jr., Gonzalo S. Leon, Robert C. Milne 1972. The Conservation Foundation, Washington D.C.

Air, water, earth and energy are considered for what they are and how they are involved in life and societies of people. The process of living is presented in its intricacy and beauty. Concern is expressed for the abuses that process is suffering at the hands of human beings. This is a well-developed introduction to ecology and is abundantly illustrated with colour pictures. This book is a good one to give people with a budding curiosity in these matters, or it may be appreciated by those who already respect life.

**The Closing Circle: Nature, Man and Technology*, Barry Commoner, 1971, Bantam, New York, N.Y.

The Closing Circle is an excellent introduction to ecology and the human role in it. Many decades of study in biology, and years of informing the public about environmental concerns have enabled Barry Commoner to make an easily read, well-documented presentation. Anyone wishing to develop a specific understanding of the ways in which humanity is affecting its environment would do well to start with this book. *The Closing Circle* also deals with complicated social issues, and the challenge of resolving the situation we find ourselves in.

****Future Environments of North America: Transformation of a continent*, Ed. F. Fraser Darling, and John P. Milton, 1966. The Natural History Press, Garden City, N.Y.

In April of 1965 the Conservation Foundation convened a conference to bring together educators and researchers knowledgeable about the biological and human life of North America. The subject areas for which presentations were prepared were: the organic world, the history and future of different regions, economic patterns and process, social and cultural purposes, regional planning and development, and organization and implementation. *Future Environments of North America* is the transcript of the thirty-four presentations as well as the introductions and the discussions that followed. Conservation News commented: "For anyone seriously concerned about the future of our continent, this book should be required reading".

***Fundamentals of Ecology*, Eugene P. Odum, 1971. WB Saunders Company, Philadelphia, Pa. and Toronto Ont.

This is a textbook of basic ecological principles and concepts, providing a comprehensive survey of how living beings interact with each other and with the physical reality they live in. The topic is viewed from the level of individual organisms, biological communities and populations of organisms as they exist at particular times and as they change over time. Life forms are also dealt with as they are found in different habitats such as: fresh and salt water, estuaries and on land. Finally, Odum looks at the ways in which people affect ecological processes and the ways in which we can use the knowledge available to us.

The Environmental Handbook, Ed. Garrett De Bell, 1970. Ballantine Books, New York, N.Y.

An anthology of writings presenting various environmental concerns followed by suggestions for individual and political action.

***_Ecotopia: The Notebooks and Reports of William Weston_, Ernest Callenbach, 1975. Banyan Tree Books, Berkeley Calif.

This environmental utopia is seen through the eyes of the first reporter from the United States to visit Ecotopia in the nineteen years since what was Washington, Oregon and Northern California separated in 1980. The reason for the separation was a desire on the part of the Ecotopians to develop an environmentally appropriate society. William Weston sends back articles and keeps a journal of his subjective experience. Through these writings the reader is presented an imaginative and insightful picture of how a society can work to produce a sophisticated yet non-destructive way of supporting itself. Valuable imagery to have.

Culture

*_Book of the Hopi_, Frank Waters, 1963. Ballantine Books, New York, N.Y.

The Hopi Indians are reputed to be the first human inhabitants of North America. This book reports their tradition, legends, ceremonies and history. As a result of experiences in their earlier civilization, the Hopi have maintained rituals around each step of the process by which they take their living from the natural world. As the seasons pass their rituals are performed and the people are reminded of their ties with the elements.

Patterns of Culture: An Analysis of our Social Structure as Related to Primitive Civilizations, Ruth Benedict, 1934. Mentor Books, New York, N.Y.

A classic which compares examples from different cultures. Ruth Benedict demonstrates the great differences that exist in "socially acceptable" behaviour. Different attitudes toward marriage, war, ownership and death are among those examined. There is much evidence here that people are molded by customs and not instinct, a realization which is the first step toward conscious cultural evolution.

Culture Shock: A reader in Modern Cultural Anthropology, ed. Phillip K. Bock, 1970. Alfred A. Knopf, New York, N.Y.

This book is a collection of writings about circumstances in different cultures. It takes us from the experience of American whalers in the mid-1800's to the food gathering techniques of the Bushmen in Africa, from English peasant life in the Fourteenth Century and the world view of the Maya people of the Yucatan. These very different life situations and many others provide experience from which to build cultural perspective. Interesting reading and a good background for considering cultural change.

******Culture Against Man*, Jules Henry, 1963. Random House, New York, N.Y.

"Drives are what urge us blindly into getting bigger, into going further into space and into destructive competition; values are sentiments that work in the opposite direction".

"Most American workers have learned to put the constantly growing standard of living in place of progressive self-realization".

Jules Henry brings years of research and study together into a revealing picture of the American culture. He looks at contemporary society, the philosophy of commercialism, war based economies, parent-child relationships, adolescents, education and human obsolescence. The subject is superbly presented, and the book a great aid to understanding what we are up against.

*****The City in History: Its Origins, its Transformations and its Prospects*, Lewis Mumford, 1961. Penguin Books, Harmondsworth, Middlesex, England

Decades of research into historical records and the remains and present forms of cities has provided rich source material for this study. The forms and functions of settlements are examined from the earliest evidence of fires and burial sites, through villages, towns and cities of various historical periods, to the megalopolis. Mumford looks at the development of human communities as they respond to beliefs, customs, ability to transport materials and other technical innovations. The organization of people into cities

has been a significant stimulus to the human experience. There is evidence, however, that the development is not always for human benefit. "Whether our scientific technology should be controlled and directed for the purposes of life, or whether life shall be regimented and repressed in order to promote the ceaseless expansion of technology is one of the main questions before mankind today".

****The Pursuit of Loneliness: American Culture at the Breaking Point*, Philip Slater, 1970. Beacon Press, Boston, Mass.

The old culture "no longer performs its fundamental task of satisfying the needs of its adherents, but it still performs the task of feeding and perpetuating itself". *The Pursuit of Loneliness* analyses the breakup of community life, our self-imposed subservience to technology, and the way we are manipulated by commercialism. These and other factors cause us to grow further apart. Our need, if we are to create a society that is fulfilling to the people in it, is to understand and overcome the dividing tendencies. This book helps.

Rethink: A paraprimitive solution, Gordon Rattray Taylor, 1972. The Chaucer Press, Bungay, Suffolk, Great Britain.

This is a look at social change. Where in our society is the value for the quality of life, stability, functional status, community, and personal identity? *Rethink* looks at the patterns around which our society developed in the past, problems that our social structure faces, and possibilities for the future. A society structured to avoid the problems of our own making would be unfamiliar and difficult to adapt to, nonetheless it seems desirable and is proposed here.

The Evolution of Man's Capacity for Culture: Six essays and summary, ed. J.N. Spuhler, 1959. Wayne State University Press, Detroit, Michigan.

These are essays on the topics: the biological evolution of a species capable of culture; the brain and behaviour; speculations on the interrelations of the history of tools and biological evolution; language; basic social capacity of primates and the social life of monkeys, apes, and primitive man. Human culture is so commonplace that most people are not conscious of its significance. These essays bring culture into perspective.

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The Social Contract: A Personal Inquiry into the Evolutionary Sources of Order and Disorder, Robert Audrey, 1970. Dell, New York, N.Y.

An examination of the human situation richly illustrated with biological precedents. In some cases parallels from the natural world clarify the situation, in others they suggest solutions. When it comes to living on the earth, human beings are relative newcomers. We would do well to pay attention to the experience gained and instinctualized by life forms millions of years older than our own.

Understanding Media: The Extensions of Man, Marshall McLuhan, 1964. New American Library of Canada, Toronto, Ont.

McLuhan presents a theory of how the introduction of new technologies affects society. He then goes on to apply the theory specifically to the effects of communication, media, speech, print, television, the telephone, photographs and others. There are also chapters on the automobile, clocks and money. This study provides a useful background for understanding change in our society.

The Medium is the Message: An Inventory of Effects, Marshall McLuhan, Quentin Fiore, 1967. Bantam, New York, N.Y. and Toronto, Ontario.

This is a book with many pictures. Its purpose is to present and to demonstrate many of the ideas worked out in *Understanding Media.*

Principles of Sociology, Ed. Alfred McClung Lee, 1951. Barnes & Noble, New York, N.Y.

A text on Sociology with sections overviewing: social problems, human ecology, race and culture, collective behaviour, institutions and the socialization of the individual.

Dreams of Reason: Science and Utopias, René Dubois, 1961. Columbia University Press, New York, N.Y.

Dreams of Reason is a look at the long-standing dream of a society ruled by common sense and fairness. The focus is on philosophical and scientific utopias. Dubois contends

that scientists are not necessarily alienated from people, but rather that they are often natural philosophers working rationally with the world to provide people with better health and more comfortable living – qualities of utopia. The point is made that scientific work should be made known to people for their use and as an ethical filter so that in the isolation of laboratories, monsters with long-term consequences are not created.

**A Celebration of Awareness: A Call for Institutional Revolution,* Ivan D. Illich, 1969. Doubleday and Company, Garden City, N.Y.

A collection of writings suggesting that individual awareness, if allowed to develop, enables people to assess their situations and find ways of improving on them that also foster self-reliance and dignity. "Institutions create certainties, and taken seriously, certainties deaden the heart and shackle the imagination". These writings were prepared on various occasions to bring into question plans being prepared to solve problems by reinforcing already overgrown, insensitive institutions such as schools, development efforts and the Church.

****Tools for Conviviality,* Ivan D. Illich, 1973. Harper and Row New York, N.Y.

Conviviality is a term used to indicate a life-style emphasizing creative relationships between people and their environment. People have abundant competence for providing for each others' needs. This ability is wasted and stifled when production is carried out by incomprehensible machinery. In such situations the basic satisfactions of mutual aid and union with the life supporting process are overshadowed.

"The only solution to the environmental crisis is the shared insight of people that they would be happier if they could work together and care for each other".

**The Greening of America,* Charles A. Reich, 1970. Bantam, Toronto, Ont.

"There is a revolution coming. It will not be like revolutions of the past. It will originate with the individual

and with culture, and it will change the political structure only as its final act. It will not require violence to succeed, and it cannot be successfully resisted by violence. This is the revolution of the new generation".

The Greening of America is a study of the changing consciousness in America and how that change affects society.

The Problem

The Coming Dark Age: What will happen when modern technology breaks down? Roberto Vacca, trans. Dr. J.S. Whale, 1973. Doubleday, Garden City, N.Y.

Extrapolations of what could happen to a society that is dependent on vast, complex systems that are beyond the control of the people they serve.

******The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind*, Donella H. Meadows, Jorgen Randers, William W. Behrens III, 1972. New American Library, New York, N.Y.

The Club of Rome is an association of scientists, educators, economists, humanists, industrialists, and national and international civil servants. Their purpose is to consider the present and future predicament of humanity. This report was prepared by a research team at M.I.T. who collected information on trends in population, food production, pollution, resource supply and industrial output, and fed it into a computer. The projection for the future was that it is impossible for our civilization to continue as it is going. The computer was used again but this time assuming changes in our collective behaviour. By restoring eroded and infertile lands, stabilizing population, recycling resources and and making manufactured goods durable, it was possible to avoid collapse. The nature of these problems are described in this book and also the way in which the results were obtained. *The Limits to Growth* is a very clear statement of the necessity to bring our society into equilibrium.

***Mankind at the Turning Point: The Second Report of the Club of Rome*, Mihajlo Mesarovic, Eduard Pestel, 1974. Dutton, New York, N.Y.

Again the computer is invoked as a navigational aid for spaceship earth. Mesarovic and Pestel employ a more accurate and sophisticated world model than that used for the *Limits to Growth*, bringing economic/geographic zones into play rather than viewing the planet as a single, homogeneous entity. Like its predecessor, it stresses the deadliness of delay in bringing about international cooperation on global strategies. The new book, however, offers more hope in that it proposes "organic growth" strategies that would limit ecology-threatening growth in the already over-developed regions, yet accommodate for an increase of food and technology in underveloped areas. *Mankind at the Turning Point* urges closing the gap between rich and poor as well as the gap between humanity and nature. A wealth of information.

**"A Blueprint for Survival" The Ecologist, 1972. Richmond, Surrey, England.

One of the earlier presentations of the human dilemma. "The Blueprint for Survival" not only outlines why change must take place but also contains an extensive strategy for that change, and a description of the desired outcome. Originally printed in "The Ecologist" magazine for a predominantly English readership, the "Blueprint" has since been put out in paperback as a direction pointer for people wherever they face the problem.

Human Settlements: Crisis and Opportunity, Barbara Ward, 1974. Information Canada, Ottawa, Ontario

Written in preparation for the United Nations Conference on Human Settlements. This book is an introduction to the problems societies are facing all around the world. Population is growing and cities are growing even faster. In the next three decades more buildings will have to be built than in all previous history, yet these new structures must be built on the experience of our past so that we do not compound the social problems that are aggravating the present situation. Barbara Ward presents the challenge.

****Operating Manual for Spaceship Earth*, R. Buckminster Fuller, 1969. Southern Illinois University Press.

In the same way that an automobile must be maintained if it is to function properly, so must the life supporting systems of our planet be maintained. The human presence on earth is sufficiently great that we must take a comprehensive attitude toward managing the limited resources with which we face the vastness of time and space. This book presents a dynamic view of world development, human intelligence and possibilities for the future.

Untitled Epic Poem on the History of Industrialization, R. Buckminster Fuller, 1962. Jonathan Williams, Charlotte N.C.

In this book the reader is presented with a quick-moving history of the evolution of the industrialized world. The focus of this work is the U.S.A., but it is evident that industrialization is guided more by other factors than national boundaries. Starting with the first European migration to North America, the accumulated effects of adventurers, discoveries and development are narrated in what Fuller calls "ventilated prose".

*****World Design Science Decade 1965–1975*, Buckminster Fuller & John McHale, World Resources Inventory, Southern Illinois University, Carbondale, Ill.

Document 1 – *Inventory of World Resources, Human Trends and Needs*, 1963

Document 2 – *The Design Initiative*, 1964

Document 3 – *Comprehensive Thinking*, 1965

Document 4 – *The Ten-Year Program*, 1965

Document 5 – *Comprehensive Design Strategy*, 1967

Document 6 – *The Ecological Context: Energy and Materials*, 1968

These are the documents produced in an ambitious project to develop a design strategy to take care of all the

world's people on a regenerative basis. The genius of Fuller and McHale leads a team of researchers to comprehensively search out the potentials of the earth, what is needed by the human family to carry out our voyage through time and space and the means at our disposal to get the resources to serve the people. The information collected and documented and the perspective developed are an inspiration and foundation for anyone concerned about the future of humanity.

***_Design for the Real World: Human Ecology and Social Change_, Victor Papanek, 1971. Random House, New York, N.Y.

To design something is to determine how it will be made. From the perspective of the human family, Papanek calls on designers to design for functionality, durability and to provide for the real needs of people rather than working in obsolescence and an appeal to whim to provide profit for industry. This book reveals the existing influences behind commercial design and presents the guidelines by which designers can make a significant contribution to improving the lot of humanity. Many practical applications of the principles discussed illustrate the presentation.

Design with Nature, Ian L. McHarg, 1969. Natural History Press, Garden City, N.Y.

Much has been lost in the past as a result of people designing roads, buildings and the like without considering the environment into which they are to be placed. McHarg gives some examples of this and then explores a technique by which an optimum synthesis of construction and nature can be worked out. This technique involves charting on separate maps of the area in question the relative desirability of locating relative to geography, waterflow, scenery, wildlife, historic significance and residential or institutional value, among other things. The maps can then be superimposed to indicate optimum building sites. The considerations involved in mapping these various values are worked through on a number of examples to give a feeling for this useful design process.

Human Potential

**Human Perception*, R.H. Day, 1969. John Wiley & Sons. Sydney, New York, London, Toronto.

Perception is the maintenance of contact between a being and its outside environment, its internal state and its postures and movements. *Human Perception* looks at the senses with which we perceive, how they work, how we use them and the variance in the information that they pass to us in relative circumstances. Anyone reading this book, in addition to gaining much information about how we are informed of our physical condition and the world around us, might well gain insight into their inner nature as receiver of sensory perseptions.

A Catalogue of the Ways People Grow, Severin Peterson, 1971. Ballantine Books, New York, N.Y.

Aikido, contemplation, dreams, meditation, psychotherapy, T-groups, yoga and Zen are a few of the many ways that are introduced in this book. Descriptions, origins, exerpts from principal sources and in some cases reference to practicing groups are included in the presentations. This book, as the title implies, is a catalogue to which people can look for help in selecting what aspects of themselves they would like to develop.

***The Master Game*, Robert S. DeRopp, 1968. Dell, New York, N.Y.

"Contemporary man, hypnotized by the glitter of his own gadgets, has little contact with his inner world... the Master Game is played entirely in the inner world...". There are great potentials within the human psyche. Robert DeRopp looks at the awakening to those potentials, charts out components of the inner world, and introduces areas of activity which lead to the attainment of full consciousness. It is a game worth playing.

About Emotions: Forces that can Make or Break, Harvey Day, 1966. The Garden City Press Ltd., Letchworth, Hertfordshire, England.

A short book that looks at how emotions are affected

by physical factors such as fatigue, hunger and hormonal balance. It also discusses the need for affection and the way that worry and emotions can affect our health.

***_Motivation and Personality_, Abraham Maslow, 1954. Harper and Row, New York, N.Y.

This volume examines the factors which cause people to act. Motivation is seen as the directing of actions to satisfy needs. When the basic needs of nourishment and shelter are fulfilled they are followed by more subtle and particularly human needs for love, belonging and a feeling of self worth. A healthy society is seen as one where these primary needs are provided for and the need for self actualization can emerge; that is, the need to develop and exercise the abilities that are within each individual. The study of mental health is said here to be more valuable than that of mental ills. The view of self actualization presented by Maslow provides light for the path toward happiness, serenity, acceptance and contentment.

Psychic Discoveries Behind the Iron Curtain. Sheila Ostrander and Lynn Schroeder, 1970. Bantam, New York, N.Y.

Telepathy, dousing, telekinesis and extra-sensory perception are among the psychic phenomena that have little credibility in the Western world. However, in the U.S.S.R. and her companion countries a great deal of research is being officially sponsored to try to understand these abilities. This book describes many of the experiments being conducted. In the light of the discoveries being made – is it wise for the West to continue to dismiss these matters as superstition?

**_The Frontiers of Being: Dynamics of Love and Awareness_, Duncan B. Blewett, 1969. Award Books, New York, N.Y.

A synthesis of past and modern philosophers to "help lead one to greater self-understanding and self-acceptance by setting forth the essentially open and loving nature that is fundamental to people".

In a world where so many people are discontent with themselves this book should be re-printed and made more easily available.

The Future of Man, Teilhard de Chardin, 1959. Translated by Norman Denny, Harper and Row, New York, N.Y.

From a planetary and evolutionary perspective de Chardin presents a sensitive and optimistic picture of humanity. Our progress and future are looked at from the point of view of consciousness and spirit. The phenomenon of the noosphere is treated in depth.

***Gandhi: His Life and Message to the World*, Louis Fischer, 1954. Harper, New York, N.Y.

When he died his possessions would have fit into a single box, yet during his life Gandhi led millions of people in non-violent opposition to the imperial control of his country. Louis Fischer recounts the story of Gandhi's life from his early years through the political struggles that he took on until his death. A life of dedication to kindness, honesty, non-violence and the exaltation of the individual human spirit.

Gandhi's Truth: On the Origins of Militant Non-Violence, Erik H. Erikson, 1969. W.W. Norton and Company, New York, N.Y.

Erikson's background in psychoanalysis is evident as he traces Gandhi's personal development, the formation of his ideals and their application in his work. Gandhi's writings and those of others involved in the events of the times are quoted extensively as the history of Gandhi's campaigns is presented.

Gandhi's Autobiography: The Story of My Experiments with Truth, M.K. Gandhi, 1948. Public Affairs Press, Washington, DC.

A first-hand account of the great man's life. Not only the plans and proceedings of his work to improve the lives of his countrymen, but also his work with himself that produced the character which gained the trust of the millions who followed his leadership and the respect even of those he opposed.

Economics

An Introduction to Modern Economics, Joan Robinson and John Eatwell, 1975. McGraw-Hill, Maidenhead, Berkshire, England.

A text on economics. The historical development and modern ideas. Land, labour, supply and demand, technical change, incomes, profits, growth of modern corporations, industries and nations, and a look at the international situation including socialism and the Third World. This book provides a good frame of reference for the discipline that has managed to get the backdoor key to board rooms and government offices over most of the planet.

*****Small is Beautiful: A Study of Economics as if People Mattered*, E.F. Schumacher, 1973. Sphere Books, London, England.

After twenty years as Economic Adviser of the National Coal Board in Britain, Dr. Schumacher has written an excellent book on the desirability of bringing the systems that support people down to a size that can be understood by those who operate them. The values of money, profit and gigantic operations are questioned in comparison with the values of health, beauty and conserving the planet. The argument is presented with both economic and humanitarian logic and is easily read.

Agriculture

**"The Journal of the New Alchemists", The New Alchemy Institute, Woods Hole, Mass.

The New Alchemists are a group of researchers and educators working with the aim of "restoring the land, protecting the seas, and informing the earth's stewards." Their work testing and demonstrating cyclic systems of compost, gardens, fish farming and people integrating with windmills and greenhouses provides one of the best examples today of how we can live with natural processes. Their Journal is a well-illustrated account of their work, what they are learning from it, and designs so others can do the same.

The Encyclopedia of Organic Gardening, By the staff of the Organic Gardening and Farming Magazine, 1959. J.I. Rodal, Editor-in-Chief, Rodale Books, Emmaus, Penn.

This book is a compilation of more than 1100 pages of information on the whole field of horticulture from the organic point of view. It describes techniques for planting, cultivating, fertilizing and harvesting vegetables, herbs, flowers, and orchards in general, and for hundreds of specific plants, as well as for insect and disease control. It also contains information on the basic principles of organic gardening and experimentation that has been carried out. With everything arranged in alphabetical order and cross referenced, this book is indeed an *Encyclopedia of Organic Gardening*.

Organic Plant Protection: A Comprehensive Reference on Controlling Insects and Diseases in the Garden, Orchard and Yard without using Chemicals, Ed. Roger B. Yepsen Jr., 1976. Rodale Press, Emmaus, Penn.

This is a big book with two sections. The first section introduces and explains the basic strategies of poison free plant protection. The second section is an encyclopediac reference to the control of more than 1000 insects and diseases that could be a problem in the garden.

Companion Plants and How to Use Them, Helen Philbrick and Richard B. Gregg, 1966. Devin-Adair, Old Greenwick, Connecticut.

All plants growing in an area are interrelated. Their influences can be as obvious as providing shade and competing for water, or they can be more subtle. The roots of some plants enrich or loosen up the soil making it more hospitable for other plants, some plants excrete substances into the soil that help or hinder their neighbours. Other plants repell insects or concentrate important nutrients. *Companion Plants* lists numerous examples of plants which are beneficial to each other and should be grown in proximity, as well as plants that should be kept apart for best results.

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Environmentally Appropriate Technology: Developing Technologies for a Conserver Society in Canada, Bruce McCallum, 1975. Environment Canada, Ottawa, Ont.

This report, prepared for the Advanced Concepts Centre of Environment Canada, covers the principles of a conserver society designed "to blend so well with the natural systems that the biosphere remains healthy while at the same time allowing us to derive a reasonable standard of living indefinitely". The report goes on to introduce planned and existing examples of appropriate technologies for producing and storing energy, agriculture, and transportation.

Energy for Man: From Windmills to Nuclear Power, Hans Thirring, 1958. Harper and Row, New York, N.Y.

An inventory of different energy technologies, their origins, the principles of their operations, and projections for their futures. Although this book is almost two decades old, the methane digester seems to be the only energy source not dealt with. These projections for the future are harbingers of what is becoming publicly known today.

Handbook of Homemade Power, The Mother Earth News, 1974. Bantam, New York, N.Y.

For people interested in working with renewable energy sources, this handbook is full of practical information. The pages are filled with "how to" accounts of using wood, water, wind, the sun and methane gas for supplying energy needs. The plans for various devices are included complete with diagrams, instructions for making them and accounts of how the devices have actually been put to use.

Alternative Sources of Energy-Practical Technology and Philosophy for a Decentralized Society, Alternative Sources of Energy, 1974. Milaca, MN.

Alternative Sources of Energy has published a magazine by that name for several years. The material brought together in this tabloid-sized book is an anthology of material collected through the magazine. It includes experiences gained by people working with renewable energy sources, contacts and accounts of sympathetic groups, networks and schools, and writings on the politics of energy, practical directions and the philosophy of the future. A large bibliography on related matters is also included.

**Nuclear Power*, Walter C. Patterson, 1976. Penguin Books, Markham, Ont. New York, N.Y.

What are nuclear reactors? How do they work? What has been their history? What are the benefits and dangers of nuclear power? What are the prospects for the future? Walt Patterson has researched the nuclear energy industry extensively to answer these questions. He has compiled his findings into this readable book. For anyone concerned or interested, *Nuclear Power* will provide an excellent background.

How Things Work: The Universal Encyclopedia of Machines, 1967. Granada Publishing, St. Albans, Hents, Great Britain.

Descriptions and diagrams of the working principles of everything from absorption refrigerators to zippers, including ball point pens, cameras, folding machines, hot plates, multistage centrifugal pumps, rubber, typewriters, vacuum cleaners and hundreds of others.